Railway Age

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The Motor Transport Meeting

THE great interest being taken by the railways in the subject of motor highway transport was well illustrated by the attendance at the motor transport conference yesterday, which was considerably larger than was expected. About 120 men, representing 51 railways, were present. The situation with which the railways were confronted, the methods they are adopting to meet it, and the results they are getting were considered in all their various phases.

The intimation which has sometimes been made that the railways have not been devoting enough attention to this subject was quite completely disproved by this meeting. The conditions that have developed and the problems arising from them are new, and naturally there has been much difference of opinion as to what to do about them and varying policies have been adopted. The study being given to the situation and the experiments being made show, as other developments within recent years have shown, that there is still no lack of initiative in the railroad industry, and in due time the railways will adopt the measures necessary to conserve their revenues so far as this is possible, while at the same time helping to give the public such improvements in service as can reasonably be brought about by the coördination of rail and motor service.

Recommended Changes in Interchange Rule 66

THE Arbitration Committee recommended that the three paragraphs of the present Rule 66 be changed and that ten new paragraphs be added. The purpose of these changes is to effect a general improvement in the situation with respect to hot boxes. A lively discussion resulted when the proposed changes came up Thursday. It was contended that the rule should contain specific recommendation as to the quality of the oil and waste used. A standard oil and waste would be desirable, but is not a necessity. If the boxes are properly packed at regular intervals, regardless of the quality of the material used, some good will be accomplished in improving hot box conditions. Furthermore, if a standard oil and waste were proposed, the railroads would probably find great difficulty in agreeing on it. The point was raised that new cars would not, as a rule, have occasion to come on a repair track within the first twelve months, with the result that the boxes would not be repacked. But sight must not be lost of the fact that the Interstate Commerce Commission rules require that the air brake equipment must be cleaned and tested every twelve months, which work can be done only on a repair track. The question of the proper quality of oil and waste will have to be solved on the basis of experience under the proposed rule. To attempt to reach an agreement before putting into effect the proposed revision of Rule 66, would serve only to delay the constructive benefits of that rule.

Electric Motor Control

IT WAS only a few years ago that electric wiring was characterized by the open knife switch and knob and tube wiring. In fact the knife switch is still used, as an emblem of electric power service. Actually it is practically extinct and is only to be found on low voltage direct-current switchboards in power houses and in a few other isolated places. Practically all electric wiring, including the switches and other control apparatus, are now completely enclosed so that the workman is effectively protected from injury and the circuits are protected from accidental injury with consequent interruption of service. Motors are protected by various means so that momentary overloads will not cause them to stop, but so that a continued overload which would damage a motor will cause the circuit to open. The automatic starter with push-button control is now being used extensively. This makes it convenient to use several motors on one machine and the starters can be mounted in remote positions where they do not take up valuable space. These developments which speed up operations and prevent accidents and delays have been rapid. Best shop practice depends upon them and there is no better opportunity to keep acquainted with these developments than by studying the electrical control apparatus on exhibit at the convention.

See the Bus and Truck Exhibits

NO one will have really seen the Railway Supply Manufacturers' Association exhibit this year who does not see and study the presentation of the bus and truck and motor equipment manufacturers in the special tent adjacent to the track exhibits. For the great majority of the visitors to the convention, no special urging to see the motor transport exhibition is necessary. The interest in buses and trucks and motor transportation among railway men is so intense at this time that the mere opportunity to see the latest designs and most modern products of the bus and truck manufacturers is grasped with all eagerness, even without a special invitation. To the few who have not already taken advantage of this opportunity, however, we take the liberty of urging that they do not neglect the chance to see a most interesting and instructive exhibit. The bus and truck exhibits are a striking revelation of the splendid contributions that the automotive manufacturers are making to better transportation conditions.

Reasons for Bad Welds

FUSION welding practice on the railroads is such today that nearly all of the welds made are good. They can be depended upon to stand up in service. Unfortunately there are occasions when a weld fails, and in almost all such cases after a failure has occurred it is found that the weld is so bad that even the layman can see that the quality is distinctly inferior. The progress of welding depends upon learning the reasons for these occasional inferior welds. The fact that poor welds appear infrequently indicates that it is not the process that is at fault. Visits to a number of shops usually disclose the fact that each shop has the "best" and "most skilful" welder in the country. Pride in quality of workmanship is a highly desirable thing, but there is a hazard in it since it may easily lead to over-estimation of a man's ability with the result that he will attempt to do or is asked to do work beyond his ability or to do things which are not good practice. Work that is rushed may have the same result. A locomotive is called for at a certain time and rather than cause a delay a welder is sometimes pushed to do a piece of work in less time than is needed for a finished job. If each weld is stamped with the welders number and the date, most of these hazards will be eliminated. It will then be possible to check the origin of the work and probably to determine under what condition the work was done. Furthermore, the welding operator will exercise a maximum amount of care when he knows his work can be traced and he will not attempt to do the work faster than he should or perform questionable operations.

Motor Bus Design and Obsolescence

MOST sensibly managed motor bus operating companies, whether railroad-owned or not, figure on a life of the bus of about four years. This figure is not universal, of course, but it is probably the average. There is good reason to believe, however, that the depreciation charge of 25 per cent per annum will soon be materially lowered. The business of bus manufacture is still in its infancy, a lusty infancy to be sure, but still, infancy. Up to a short time ago, bus design was a matter almost entirely of experiment. Experiment as the basis of design always gives way before experience and the experience in bus operation which had been lacking has now been acquired. The buses that were made last year were better buses than those that had been made the year before. The buses that are being made now are better buses than those that were made last year. The splendid examples of the work of the automotive engineer that are being exhibited in the motor transport tent are the result of designs based on experience. Experience has shown how buses can be made to live longer and go farther while providing more comfort for passengers, and the bus manufacturers represented at the conventions this year have built that experience into their products. Obsolescence will not overtake them with the speed that it overtook their experimental predecessors.

Progress in Testing Power Brakes

IN DISCUSSING the American Railway Association power brake tests, the *Railway Age* said editorially on page 366 of its issue of February 6: "What is apparently the most comprehensive, critically accurate and unprejudiced study of brake action ever made in this country, is now in progress at Purdue University under the supervision of H. A. Johnson, director of research of the American Railway Association. One has but to visit the test plant at Purdue to be impressed with the magnitude of the work, its importance and the signal success which has so far attended efforts to make the investigation accurate and unprejudiced." The progress of the work since February, as brought out in Mr. Johnson's progress report before the Mechanical Division yesterday, gives no cause to detract one whit from the force of this statement. Tests have not progressed at the rate expected and hoped for because of the very thoroughness which is one of their chief assets. The general plan has been followed of including in the schedule of tests any test requested by any of the interested parties. The ideas of the Bureau of Safety of the Interstate Commerce Commission and those of the Committee on Brakes and Brake Equipment are also included, resulting in a schedule of tests somewhat longer than might be considered strictly necessary, but one to which all are in agreement. The completion of these tests and the preparation of the report is a task of great magnitude which may well tax the ability of Mr. Johnson and his corps of assistants to the limit. More power to them!

Railway Mechanical Officers and Motor Transport

ON most of the railways now operating buses or trucks through subsidiaries, the mechanical department officers of the railways are charged with the supervision of the maintenance of the highway equipment of the auxiliary company. To their manifold duties, therefore, has been added the necessity for becoming thoroughly familiar with these new transportation tools. The mechanical officers are extremely fortunate this year in being provided with a chance to get acquainted with buses and trucks and to learn what goes into them, and how it all works in the production of efficient transportation service. Bus maintenance problems are little different from locomotive and car maintenance problems, but the difference, although small, is important. The representatives of the bus and truck manufacturers exhibiting in the motor transport tent have a world of practical information and advice on bus and truck maintenance problems. It is available to all visitors for the asking. The railway mechanical officers are showing daily a keen desire to learn about buses and trucks and their maintenance that speaks well for their foresight.

Possibilities of Electrical Equipment

RAILWAY managers are scarcely to be expected to be thoroughly versed in all of the intricate details of electrical equipment and its installation, and it is unfortunate that more data is not readily available to show in dollars and cents just how much has been saved by the application of electrical power to machinery of all kinds. Comparative figures are not any too plentiful, but we do know that electrically driven equipment frequently does save money and in no mean proportions. In one instance, a coal hoisting device which cost over $85,000 will pay for itself in a little more than four years. And in another instance $50,000 worth of electrical equipment was purchased with the understanding that it was to be paid for out of savings it effected, and it has all been paid for. There is no question but that electrical apparatus will often pay big dividends on any investments made in it.

Utilization of Alloy Steels for Locomotive Parts

THE tremendous increase in the size and weight of locomotives during the last few years has caused the limits of the possibilities of carbon steel to be practically reached for many parts. The greater cost and the greater earning power of these locomotives make it more necessary than ever to keep them in service, and the additional first cost of alloy steels in many locomotive parts is more than offset by the reduction in maintenance costs through the elimination of failures and in some cases by the greater length of service per unit of wear. While an improvement in the physical properties of the simple carbon steel can be obtained by heat treatment, only a relatively small increase can be obtained without danger of producing brittleness. There are alloy steels for use in locomotive parts which respond to heat treatment with the development of a high elastic limit, or useful strength, in proportion to the ultimate strength, without loss of the highly essential ductility and with the development of high wear-resisting qualities.

Alloy steel forgings are being and should be more extensively used, particularly for such parts as axles, connecting rods, piston rods, crank pins, and various other parts subject to repeated stresses and heavy wear.

So far the railroads have taken advantage of these desirable physical characteristics for the expressed purpose of increasing the factor of safety and thereby reducing to a minimum possible failures of these parts. However, it is possible to take further advantage of the inherent physical characteristics of alloy steels by reducing the cross-sectional area of the reciprocating parts, which is always desirable on modern heavy locomotives. There will thus be less reciprocating weight to be counterbalanced, which will make possible a closer approach to proper counterbalancing, so much desired but so difficult to obtain on heavy locomotives. The development and utilization of alloy steels has been very considerable within the past few years. The railroads have been cognizant of its inherent possibilities but have been somewhat timid in using these steels for reducing locomotive weight owing to the desire to increase the factor of safety of parts under great working stress and also because some of them had unfortunate experiences with alloy steels in their earlier development. However, alloy steels are acteristics which developments are making available should be closely watched by the roads for a possible solution of some vexing problems of design now confronting them.

Today's Program

The entire day has been set aside by the Mechanical Division of the American Railway Association to view the exhibits. The next regular session of the Mechanical Division will be held on Monday morning.

Visitors who are not familiar with earlier issues of the *Daily Railway Age* must remember that, in addition to the exhibits on the Million Dollar Pier, there is a large Machinery Hall directly across the Boardwalk from the pier. Then there is the Motor Transport Exhibit in the tent two blocks south of the pier, adjacent to the Boardwalk. On either side of the Motor Transport Exhibit will be found track exhibits.

R. S. M. A. Annual Meeting

The annual meeting of the Railway Supply Manufacturers' Association will be held in the Convention Hall on the Million Dollar Pier at 12 o'clock noon.

District meetings for the elections of members of the Executive Committee will be held in Manager Hill's office on the pier from 9 a. m. to 11 a. m.

Entertainment

10.30 a. m. Orchestral Concert, Entrance Hall, Million Dollar Pier.

3.30 p. m. Orchestral Concert, Impromptu Dancing, Entrance Hall, Million Dollar Pier.

9.00 p. m. Informal Dance. Special Musical Revue arranged by Tulsa Lee, New York, Ball Room, Million Dollar Pier.

Sunday's Program

3:30 P. M.—Sacred Concert, Music Rooms of Marlborough-Blenheim

MR. LEO SACHS ORCHESTRA

MARLBOROUGH-BLENHEIM QUARTET

THE ARTISTS

Fernanda Guarneri.....Baritone

Beth McCoy.....Soprano

Rudolph Hilldeman.....Piano

Registration Figures

THE registration is still maintaining its lead of 1,000 over all previous records. At four o'clock of the third day the total attendance was 5,690 as against 4,665 at the same time two years ago. There has been a large increase in the number of railway men, the total being 940 as against 772 at the last convention. Below is given a table of comparison for the past four conventions.

	1920	1922	1924	1926
Division V-Mechanical	666	554	772	940
Division VI-Purchases & Stores	37	26	21	450
Special guests	285	276	419	340
Railroad ladies	413	421	607	745
Supply men	1935	2015	2300	2615
Supply ladies	649	432	546	600
Totals	3985	3724	4665	5690

Lost and Found

THE following badges have been lost: Nos. 425, 909, 3423, 3458, 5090, 5213, 5444, 5446, 5678, 5694, 5990, 6143, 6187, 6842, 6919, 6966, 7101, 7193, 8574, 8676, 8754, 8833, and 8927. Please return to Secretary Conway's office.

A number of lost articles have been found, including a glove, a bracelet, a handkerchief, a scarf, badge No. 5684, etc. These can be obtained at Secretary Conway's office upon proper identification.

Curtis and McKelligon to Lead Division VI

As a result of the election held by Division VI—Purchases and Stores, A. R. A., prior to its adjournment on Friday, D. C. Curtis, chief purchasing officer of the Chicago, Milwaukee & St. Paul, was selected chairman of the association for the ensuing year and A. S. McKelligon, general storekeeper of the Southern Pacific, Coast Lines, was selected as vice-chairman.

When D. C. Curtis was chosen as supervisor of stores of the Northwestern Region by R. H. Aishton, now president of the American Railway Association, but then director of the Northwestern Region under the United States Railroad Administration, he was given to understand by Mr. Aishton that if he made no more than three mistakes out of ten, his success in that position was assured. That

D. C. Curtis

Mr. Curtis evidently lived up to this requirement has been proved by subsequent events, the last of which has is his election as chairman of Division VI.

Mr. Curtis was born in 1878 at Remington, Ind., and entered railway service in 1898 as an office boy in the engineering department of the Chicago, Burlington & Quincy at Chicago. He was transferred to the mechanical department in 1899 and in 1904 was placed in charge of the piecework department. In 1907 he was transferred to the stores department, where he was promoted to inspector of stores in 1909. In 1914, he was advanced to traveling storekeeper and held that position until Mr. Aishton, as indicated above, chose him to fill the capacity of supervisor of stores of the Northwestern Region, under the United States Railroad Administration.

After the close of the Railroad administration Mr. Curtis left railway service to become connected with the Oakland Motor Company, but served in this capacity only a few months when he re-entered railway service as general storekeeper, Lines East, of the Chicago, Milwaukee & St. Paul, with headquarters at Milwaukee. It is particularly significant that at the first of this year Mr. Curtis was advanced from this position to that of chief purchasing officer of the Chicago, Milwaukee & St. Paul.

Mr. Curtis has been active in the Purchasing and Stores Association, not only throughout its identity as Divion VI, A. R. A., but while it existed as the Railway Storekeepers' Association. He has been chairman of several committees and during the last year has served as vice-chairman of Division VI.

Mr. McKelligon has the distinction of having begun his railroad career as a fireman. His first connection with the handling of materials and supplies occurred when a master mechanic on the Tucson, N. M., division of the Southern Pacific, appointed him storekeeper at that point. This was during the period when all activities of this nature on the Southern Pacific were under the jurisdiction of the respective master mechanics. Mr. McKelligon served as storekeeper at this point until 1906, where he was found by H. C. Pearce, now chief purchasing officer of the Chesapeake & Ohio, but who had been selected at that time to organize a stores department on the Southern Pacific, Coast Lines. So impressed was Mr. Pearce with Mr. McKelligon that, according to the story, Mr. McKelligon was the only division storekeeper retained for service in the reorganization. Under the jurisdiction of Mr. Pearce, Mr. McKelligon was subsequently transferred to Sacramento, Cal., as division storekeeper and later to Portland, Ore., where he served as district storekeeper until his subsequent transfer in the same capacity to Oakland, Cal.

It was while at Oakland, following Mr. Pearce's connection with the Chesapeake & Ohio, that Mr. McKelligon was promoted to general storekeeper of the Coast Lines of the Southern Pacific, a position which he still occupies. Mr. McKelligon, like Mr. Curtis, has also been active in the purchasing and stores officers' associations for many years, having become a member of the Railway Storekeepers' Association about 1909. He has been a chairman of many committees, has been conspicuous in conventions for the constructive character of his discussions, and was elected last year to serve on the General Committee.

General Committee

The following members were elected to serve on the general committee for two years: C. D. Young, stores manager, Pennsylvania, and retiring chairman of Division VI; L. Lavoie, general purchasing agent, Canadian National; C. E. Walsh, assistant purchasing agent, Pennsylvania; J. L. Woods, purchasing agent, Nashville, Chattanooga & St. Louis; C. C. Dibble, general supervisor of stores, New York Central Lines; W. Davidson, general storekeeper, Illinois Central; O. Nelson, general storekeeper, Union Pacific Railroad. As a consequence of A. S. McKelligon's election to vice-chairman and the necessity, therefore, of his retirement as a member of the general committee, H. C. Stevens, general storekeeper of the Wabash, was elected a member of the general committee for one year, to fill this vacancy.

Following the election of the above officers and also members of the nominating committee for the ensuing year, the seventh annual meeting of Division VI—Purchases and Stores, A. R. A., was adjourned.

Motor Officers Propose Permanent Organization

RAILROAD officers concerned with motor transport—120 of them, representing 51 roads—at their meeting at the Marlborough-Blenheim yesterday voted, after considerable discussion, to empower the chairman to take steps looking toward another meeting and, probably, the formation of a permanent association.

The meeting was called for the purpose of bringing together railroad officers who are working on this problem and, as one of the speakers said, to exchange ideas and profit by each other's experience—happy or otherwise. To insure a free discussion of the problems involved, only persons in the railroad field were admitted and no detailed report of proceedings will be given out except to railroad people.

F. J. Scarr, supervisor of motor service, of the Pennsylvania, called the meeting to order and W. H. Lyford, vice-president and general counsel of the Chicago & Eastern Illinois, was elected temporary chairman. The discussion was opened by Samuel O. Dunn, who spoke of the relationship of highway transport to the railroads. G. C. Woodruff, assistant freight traffic manager of the New York Central, then spoke on the motor truck in freight service and E. J. Phillips, vice-president of the New England Transportation Company (New York, New Haven & Hartford), spoke on the motor vehicle in passenger service. A. P. Thom, Jr., general solicitor of the Association of Railway Executives gave an address on proposed legislation, treating briefly of the coming I. C. C. investigation of railway use of motor vehicles. S. B. Moore, of Houston, Tex., gave a brief talk on highway construction problems.

At the afternoon session F. S. Hobbs, manager of the New England Transportation Company, described its bus operations. The remainder of the session was devoted to a discussion of the formation of a committee to call another meeting. It was decided to empower the chairman to appoint a committee of 12 from the following roads: Pennsylvania; New York Central; New York, New Haven & Hartford; Boston & Maine; Chesapeake & Ohio; Spokane, Portland & Seattle; Southern Pacific; Atchison, Topeka & Santa Fe; Seaboard Air Line; Chicago, Burlington & Quincy; Missouri Pacific, and Denver & Rio Grande Western.

This committee will be empowered to call a meeting later in the summer somewhere in the territory surrounding Providence, R. I., and also to take such steps as may be desirable toward forming a permanent organization of railroad motor transport officers.

Friday's Entertainment

YESTERDAY'S cool and otherwise perfect brand of Atlantic City weather contributed largely to the day's entertainment features provided by Entertainment Committeeman Cooke and his able assistants. In the morning, as usual, an informal concert was enjoyed in Entrance Hall and in the cool afternoon many convention people filled the floor of the hall and danced from 3:30 to 5. At 4 o'clock the orchestra played "How Dry I Am" whereupon the management served tea and dainty cakes and confections.

After dinner, in honor of the many members across the invisible border of the country to the north, Canadian night was observed. The social activities in Entrance Hall were staged in behalf of Section VI, Purchases and Stores, A. R. A. Fourteen dances were enjoyed, the excellent music being furnished by Joe Samuels and his Music Masters.

The special features of the evening were under the direction of Miss Tulsa Lee and were staged between dances three and four, six and seven, and nine and ten. They consisted of a Highland reception, in costume, given by Frank MacIlhair and his twelve assistants. The native songs and dances of "Bonnie" Scotland were greatly enjoyed. The other special feature was the fancy dancing of Virginia Collins and partner.

For the success of the evening's entertainment the following gentlemen received due credit: W. G. Krauser, chairman; J. W. Coleman, vice-chairman; D. R. Arnold, J. J. Cizek, G. L. Gordon, P. L. Maury, H. A. Pastre, L. B. Rhodes, J. R. Wetherald and R. W. Williams.

Registration, American Railway Association

Division V—Mechanical

Ambrose, D. M., Asst. M. M., B. & O.
Baird, M. A., Sig. Eng., Erie, Traymore
Baker, S. E., For. B. & O.
Barnhart, S. H., Asst. Val. Eng., N. & W., Marlborough
Bentley, W. F., Spec. Inspr., B. & O., Pennhurst
Bierlein, Rudolph H., A. B. I., A. C.
Blankenship, C. N., A. C. I., Princess
Brangs, P. H., Arlington
Brockman, M. R., Gen. For., So., Apollo
Brown, Chas. G., Gen. Sol., Huntington & Broad Top. Mt., Chalfonte
Buckley, Wm., Inst. A. B., Penna.
Burbie, G. E., Insp., Swift Ref. Co., Ritz
Carlton, E. T., Ch. Car Insp., L. I., Strand
Caruthers, E. W., Supvr. Draft., Penna.
Cavin, W. M., A. C. L., Princess
Chase, E. P., Asst. Elec., Penna., Pennhurst
Chase, H. C., Supt. of Prod., N. Y. N. H. & H., Carolina Crest
Cline, R. H., M. M., B. & O., Princess
Coddington, H. W., Eng. of Tests, N. & W., Marlborough
Colligan, P. J., Shop Supt., C. R. I. & P., Marlborough
Cordts, B. F., Asst. For. L. I., Knickerbocker
Co:son, G. S., Master Painter, N. Y. C., Louvan
Cox, G. W., Asst. Eng. M. P. & R. S., Dept., N. Y. C.
Crawford, J. B., Asst. Gen. Mgr., Pac. Frt. Exp., Ambassador
Daehling, August, Insp. Penna.
Droege, John A., Gen. Mgr., N. Y. N. H. & H.
Duncan, J. A., Shop & Equip. Insp., N. Y. C.
Edmondson, W. G., Asst. Eng. Mot. Pow., P. & R., Strand
Edwards, H. P., Gen. Mgr., A. & W., Breakers
Eklund, E. G., G. F., Rut., Chalfonte
Ellis, D. S., A. E. M. P., N. Y. C., Dennis
Emrick, V. R., Ch. Elec., F. E. C.
Ewing, Charles H., V. P., P. & R.
Falck, Frederick M., Gen. Mgr., P. & R.
Farr, B. J., Supt. M. P. & Car Dept., G. T. W., Marlborough
Fey, P. M., Gen. For., B. & O.
Filskov, T., Ch. Eng. & Supt., Raritan River
Finnegan, J. A., For. of Automatics, B. & O., Millers Cottage
Foreman, W. O., Mech. Supt., B. & M., Dennis
Freesh, F. H., For., Penna.
Fromm, A. B., Mo. Pow. Asst., I. H. B., Webbers
Fuller, W. A., Asst. to Gen. For., N. Y. C., Louvan
Gallagher, R. E., Asst. E. E., L. & N., Ritz
Gardner, J. E., Gen. A. B. Supvr., B. & M., Morton
Garner, J. R., Gen. For., Penna., Strand
Gaughan, R. P., For. Wheel Shop., C. of N. J., Healey
Geisling, Chas., Gen. For., Penna.
Geist, J. R., Spec. Pass. Car Insp., B. & O., Devonshire
Giddings, H., V. P. & G. M., Pac. Frt. Exp., Traymore
Graeber, C. H., Car Dept., N. Y. C., Runnymede
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Hardy, Wm. E., Fuel For., C. of N. J., Brady House.
Harlan, S. B., Mach. Shop For., N. Y. C., Princess
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James, Chas., M. S., Erie, Haddon Hall

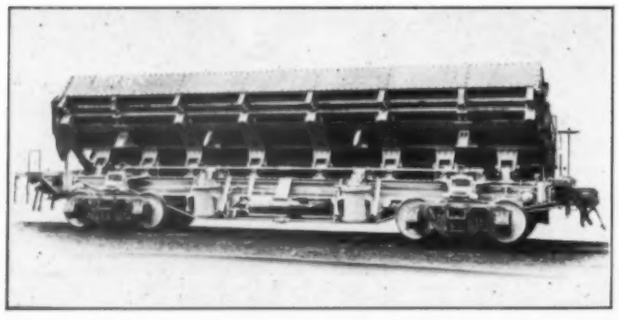
(*Continued on Page* 1711)

Improved Refrigerator Car Designed and Tested on the Chicago, Milwaukee & St. Paul

Freight and Passenger Car Exhibits

Track Exhibits of Freight Cars are Varied and Extensive— Passenger Equipment Mainly Self-Propelled

THE exhibits on the Reading and Pennsylvania railroad tracks on Mississippi and Georgia avenues, a few blocks south of the Pier, are not separated into groups of freight cars, passenger train cars and locomotives. This plan is, however, perhaps the best one as no matter in what type of rolling stock one may be interested, he will find much to repay him well for the time spent in examination of the various equipment included in the track exhibits. The freight equipment shown is



Drop Door Type Koppel Dump Car, Showing Operating Mechanism

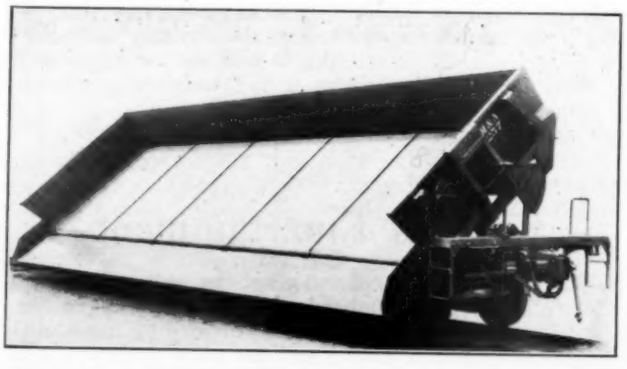
quite complete and consists of the cars which are briefly described below.

The multiple-unit trailer car built for the New York, New Haven & Hartford is the only passenger car shown, other than the self-propelled motor cars, which will be described separately.

Universal Refrigerator Car

The car shown on Mississippi avenue by the Union Refrigerator Transit Company is of a new design which was developed by the mechanical department of the Chicago, Milwaukee & St. Paul. This refrigerator car is unusually well insulated, the object being to obtain a more efficient vehicle for transporting perishable products and to deliver them to the consumer in the best possible condition. At the same time every thought was given to producing a design which would establish a saving in ice consumption.

The engineers of the C. M. & St. P. reasoned that the conventional wire basket bunker as universally used could be decreased in size in direct proportion to the insulation efficiency of the car, as far as maintaining a certain tem-



When in the Dumping Position the Door Extends 4 ft. 3 in. from the Rail

perature was concerned, but realized that by reducing the size of the bunker, the efficiency of precooling the car would be impaired. For this reason, a new type of divided wire basket bunker was introduced, which provides larger cooling surface or greater exposed ice surface than employed in the conventional wire basket bunker, and at

the same time reduces the ice capacity approximately 25 per cent.

The two sample cars built have been in service since June, 1923, and have been subjected to several tests, including two supervised by the U. S. Department of Agriculture.

These tests showed conclusively that the theory of the divided wire basket bunker was fundamentally correct. From one of the illustrations it will be seen that the divided wire basket bunker consists of a built-up wire netting wall, having the sides and ends separated from the inside lining of the car in the same manner as the conventional construction now employed. The new feature in this design is that three flues are introduced. The center flue completely divides the bunker into two parts while two intermediate flues extend to only about two thirds of the height of the bunker. All the flues are open at the bottom. The object of having these flues at different heights is to obtain the largest possible exposed surface for a given amount of ice. It will be seen that when the ice bunker is filled with ice, the intermediate flues are

The Seating Capacity of this Car is 120 Passengers.

closed up, but when the ice has melted to a point below the top of these flues, additional cooling surface will be available, with the result that a more uniform temperature can be maintained.

In the very complete series of tests which were conducted in September, 1925, observations were made in the following cars:

Car A—Regular standard construction present day service U. R. T. divided wire basket bunker type car.

Car B—Newly completed large steel frame refrigerator car built by the American Car & Foundry Company for the U. R. T. Company. This car was also of the divided wire basket bunker type, with a large ice capacity.

Car C—Regular present day service U. R. T. brine tank car.

Car D—Brine tank car packers' type. This car had no insulated bulkheads as compared with the others.

Each of the cars was completely equipped with a series of 12 test thermometers. After being loaded with meat products at Ottumwa, Iowa, they were run through in the same trains to Paterson, N. J., by way of Chicago, Buffalo and New York. The cars were accompanied by a test crew of 10 men who kept records, took temperatures and made a careful examination of the contents at the point of delivery. Expressed very briefly, the tests indicated that the car equipped with a divided wire basket bunker can be pre-cooled much quicker than one having brine tanks. Furthermore, the drop in temperature was so sudden that pre-cooling can practically be done away with, the car being iced in the morning and loaded in the afternoon, thus saving a day at each time of lading. In the car with the improved bunker, lower temperatures were maintained and an inspection of the lading at destination showed it to be in a noticeably better condition and with less signs of moisture than that in the brine tank cars.

As a result of this test, which was pre-eminently satisfactory, 100 cars are, being built at the present time for the exclusive use of the Morrell Packing Company, Ottumwa, Iowa.

Although much progress has been made in recent years in refrigerator car design and construction, the divided wire basket bunker shows a decided improvement over former designs of ice bunkers and bids fair to meet with the approval of carriers and shippers.

Reading Gondola Car

The freight car contribution of the Reading to the Mississippi avenue exhibit is a Class GM 70-ton steel gondola with drop ends and solid wood bottom. This car, which is 46 ft. long and 9 ft. 6 in. wide, inside, was built by the Bethlehem Steel Company and weighs 50,100 lb. light, which makes the load limit 159,900 lb. as the axles have 6-in. by 11-in. journals. It has inside stake pockets and 1,325 cu. ft. capacity. Equipment includes Miner A-2-X draft gear, Carmer improved coupler release and turndown hand brake staff.

An interesting feature of this car is the use of Taylor

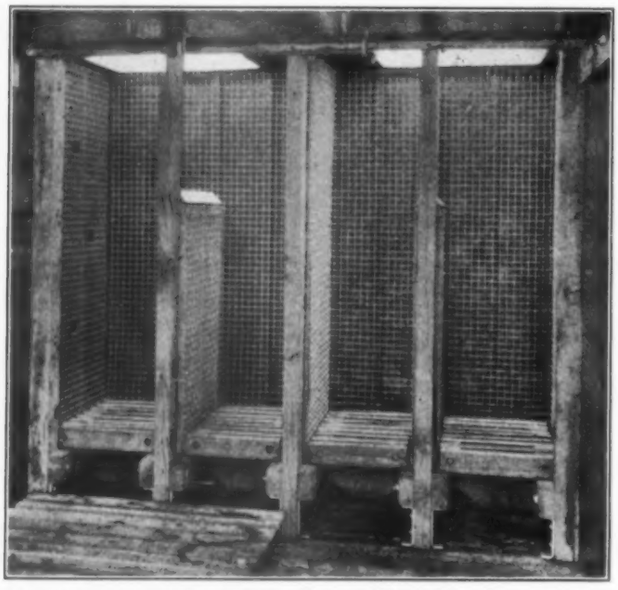
The N. Y. N. H. & H. Trailer Car for Elecric Suburban Passenger Service the Light Weight of which is 104,000 lb.

flexible trucks furnished by the Bettendorf Company. Another point which will receive attention is the finishing in Orion material a lacquer furnished by the Paint Products Corporation, Philadelphia.

Koppel Air Dump Cars

The Pressed Steel Car Company, through its subsidiary, the Koppel Industrial Car & Equipment Company, has developed a line of automatic air dump cars ranging in capacity from 12 to 45 cu. yd. and carrying loads up to 75 tons. These cars are of two general types, those having lift doors and those having extension drop doors.

When in the dumped position, the drop door extends 4 ft. 3 in. from the rail, thereby insuring the load being discharged clear of the bed of the track even when the



Divided Wire Basket Bunker of C. M. & St. P. Universal Refrigerator Car

car is dumped on ground level with the track bed. The doors operate automatically in conjunction with the movement of the body by means of a simplified mechanism located at the ends of the car. The load may be dumped to either side as desired, the dumping being accomplished by means of air cylinders placed at each side of the center sills.

A 30-yd. car of 100,000 lb. capacity is shown in operation on Georgia avenue and next to it is another Koppel air dump car of 80,000 lb. capacity, which belongs to the Baltimore & Ohio.

Clark Dump Car

An extension side dump car, Type G6, is one of the cars on Mississippi avenue. Its capacity is 30 cu. yd., level, or 43 cu. yd., 100,000 lb. normal loading. The light weight is 58,700 lb., and the load limit 110,300 lb. The Clark Car Company has provided for a supply of compressed air so that the operation of the car may be shown and the provision for balancing the load and moving parts throughout the operation of dumping demonstrated.

Hart Selective Cars

On the Mississippi avenue tracks the Rodger Ballast Car Company is showing an improved Hart selective hopper ballast and coal car with Maxends. When the car is used for ballast service, the entire load is carried in the center, the ends not being used. Long end slope sheets guide the load toward the center, while the dumping provisions are such that the ballast may be unloaded either between the rails or at the side as desired. For side dumping, the material is guided by long side aprons. When the car is used for handling coal or other commodities the hopper shape ends, as well as the center portion, are used, thus adding materially to the carrying capacity. Supplementary side-discharging doors are provided for discharging the additional load carried in the car ends.

Two cars are exhibited, both of practically the same design. One, marked RBC—X17131, was built in July, 1924, and is in the condition found when taken out of service to be sent to Atlantic City. The nominal capacity is 100,000 lb., and the light weight 45,800 lb. The carrying capacity for coal is 1,988 cu. ft. when level full. The second car is a new one built in March, 1926, for the D. L. & W. It is slightly lighter than the first car, weighing 44,600 lb. As the trucks have 5½-in. by 10-in. journals, the load limit is 124,400 lb.

This car is equipped with the new Carnegie light weight, one wear, steel freight car wheel.

Globe Door Hangers

The new M-K-T box car on Mississippi avenue is equipped with Globe trackless door hangers. The hanger on one side is of the outside type similar in general design to that shown at the 1924 convention. The other side of the car is fitted with a new type of hanger having the mechanism on the inside, thus providing a flush type door and doing away with any objection that may be raised to an outside mechanism.

Scale Test Car

On the Georgia avenue tracks, the Southwalk Foundry & Machine Company has one of its scale test cars, such as those now in use on many roads for checking up track scales.

Enterprise Cars

The Enterprise Railway Equipment Company, Chicago, is showing five representative cars of various designs which make a very complete exhibit of their best-known types.

The first car, known as a "general service car," is of composite structural steel and wood construction. It is fitted with 16 doors and, with a length of 41 ft. and a capacity of 1,913 cu. ft., carries a limit load of 121,100 lb., the light weight being 47,900 lb. This car was built by the Ryan Car Company.

The second car is a convertible plow ballast gondola car built by the Mt. Vernon Car Manufacturing Company. As a gondola, it is 41 ft. 6 in. long and is 29 ft. 6½ in. long inside when used as a ballast car. Its capacity is 1,672 cu. ft. as a gondola and 1,298 cu. ft. as a ballast car. The light weight is 57,900 lb., which gives a limit load of 111,100 lb.

A third car is known as a "multi-service gondola" built by the Bethlehem Steel Company. This car is provided with six hoppers.

The fourth car is a "multi-service hopper car" built by the Pullman Car & Manufacturing Corporation. It is 33 ft. long, has high sides and is arranged for center or side dumping of ballast. It is of 1,951 cu. ft. capacity and weighs 48,200 lb., making the load limit 120,800 lb.

The last car is C. C. & St. L. two-door hopper car built by the Ralston Steel Car Company. It is equipped with Enterprise Type D door operating mechanism.

N. Y., N. H. & H. Trailer Car for Electric Suburban Service

Included in the track exhibit is one of the 37 trailer cars built for the New York, New Haven & Hartford by the Osgood Bradley Company, Worcester, Mass. Included in the same order were 25 motor cars for the same service. The bodies of the trailer cars, which weigh 74,000 lb., are carried on two four-wheel pedestal trucks, the wheel bases of which are 7 ft. 6 in. The trucks, which are provided with 36-in. wheels, weigh 30,000 lb., which makes the total light weight of the cars 104,000 lb.

There are 20 reversible back, three-passenger seats and 30 two-passenger seats. The total seating capacity provided is thus sufficient for 120 passengers. The aisle width is 21¾ in. between the arm rests of the seats.

The underframe consists of two side sills and two center sills in one piece, the center sills extending beyond the built-up body bolsters.

The ceiling and sides back of the basket rocks consist of ¼-in. agasote, car ends are of 3/32-in. steel and the remainder of the car interior is of No. 22 gage steel. The roof sheets are .078 in. copper bearing steel and the vestibules and doors are also of copper bearing steel. All the other doors are of Mexican mahogany. The platforms are designed for unloading the passengers at station platforms elevated 4 ft. above the top of the rail.

There are twenty-five 22-in. by 30-in. windows on the saloon side of the car and 26 windows on the opposite side. Fourteen ventilators are provided. The cars are equipped with 52 side electric heaters, arranged with top and bottom rows of coils and are lighted with 35 fixtures located directly over the seats.

The brake equipment is Westinghouse Type ATUE-1-16 with ME-30 brake valves and F Type American automatic slack adjusters. Miner Class A-5-P draft gear. Type B-10 buffer and safety locking centering pin; Adams & Westlake hand brakes with the drop handle; and Barco flexible joints are also among the car accessories.

The following are some of the principle dimensions:

Length over body end sheets	69 ft. ¾ in.
Length over buffer face plates	79 ft. 7¼ in.
Width over sheathing	9 ft. ⅜ in.
Width over side plates	9 ft. 10 in.
Width over vestibule posts	9 ft. 10-⅜ in.
Width over gutters	10 ft. 9/16 in.
Height from top of rail to top of side plate	11 ft. 2-⅛ in.
Height from top of rail to top of roof	13 ft. 3/16 in.
Height from top of rail to top of body floor	4 ft. 5-⅜ in.
Distance from center to center of trucks	52 ft. 6 in.

Registration, American Railway Association

(*Continued from Page* 1707)

Jenks, W. J., V. P., N. & W., Marlborough
Johnston, C. E., V. P. & Gen. Man., K. C. S., Shelburne
Johnson, E. L., Asst. Eng. of Tests, N. Y. C., Haddon Hall
Keagy, C. O., Gen. For., Penna., Strand
Kemmerer, K. A., Pres., P. B. & N. E., Ambassador
Kerr, J. G., Asst. to V. P., L. & N., Raleigh
Kincaid, C. L., E. E., L. & N., Ritz
Knowlton, C. H., Asst. Eng., N. Y. C.
Koch, Philip, Gen. For., P. & R.
Koebrick, F. W., Gen. For., L. I., Strand
Kutner, S. D., Asst. Eng., N. Y. C., Marlborough
Lake, C. S., Asst. to Pres., C. & O. & H. V., Marlborough
Leard, H. S., Supvr. Pass. Oper., S. A. L.
Loveru, Ross E., A. B. I., A. C.
Lupton, G. W., Asst. to V. P., A. T. & S. F., Strand
McDonough, E. M., Supvr. Prod., N. Y. N. H. & H., Carolina Crest
McKinsey, C. R., Am. Car & Fdy. Co., Ritz
McNellie, J. K., Supt., D. & H., Marlborough
Maidson, John O., Engr. Car Equip., I. R. T., Strand
Manahan, D. F., For. Car Insp., Penna.
Manchester, H. C., Member
Martin, W. E., P. & R., Strand
Mason, E. J., Asst. M. M., Penna., Chalfonte
Massy, George H., Gen. Mech. Insp., C. of N. J.

(*Continued on Page* 1738)

Conventionalities

F. W. Dickinson and his son, T. R., master car builder and division storekeeper, respectively, Bessemer & Lake Erie, have been regular attendants at the Atlantic City conventions for many years.

President Frank J. O'Brien of the Globe Steel Tubes Company arrived Thursday. He was accompanied by Rick Lally, the "globe trotter" of the company, who returned Wednesday on the steamship Paris from a six weeks' European trip.

Few members of the Mechanical Division in the United States have traveled further to attend the convention this year than George McCormick, general superintendent of motive power of the Southern Pacific, with headquarters at San Francisco, Cal. Mr. McCormick is enthusiastic about the performance of the Southern Pacific three-cylinder locomotives, of which there are 13 in service and 23 on order. This power is being used in heavy passenger service on mountain grades, also taking the place of Mallet locomotives in heavy freight service. Mr. McCormick says it is popular with operating men and engine crews alike.

H. B. Oatley, vice-president, Superheater Company, who is chairman of the Railroad Division of the American Society of Mechanical Engineers, reports that the division is functioning 100 per cent. The Research Committee of the division, of which R. M. McConnell, Baldwin Locomotive Works, is chairman, has begun work collecting facts and data relative to the opportunities afforded the young mechanical engineer in railroad work. An excellent program has also been arranged for the Railroad Division session at the annual meeting in December. The feature of that session will be a paper on "High Pressure Locomotives," which will be presented by two well-known mechanical engineers, authorities on that subject.

Frank H. Clark is attending the convention this year in an entirely new and, for him, unusual capacity. Mr. Clark attended his first convention at Saratoga in 1889—thirty-seven years ago. For the greater part of the time since he has been identified with railway supply interests. Two years ago he was on the pier as vice-president of the Elvin Stoker Company, but following the consolidation of that concern with the Locomotive Stoker Company, Mr. Clark has been enjoying a well-earned vacation before resuming his activities in the railway supply field. Judging by the greetings he is getting from old friends, he finds the experience of having no business responsibilities at one of these busy sessions to be both novel and delightful.

W. G. Black, superintendent motive power of the Nickel Plate, has a railroad background which, although it may be equaled by others, can hardly be exceeded because it takes in the whole history of the development of American railroads and motive power. Mr. Black's grandfather, John Black, when a young man, helped John Dripps assemble the first locomotive, imported from England, for operation on what is now the Pennsylvania Railroad. Mr. Black's father was also a railroad man; he spent his life in the motive power department, and at one time was master mechanic on the Rock Island.

A. L. Humphrey, president of the Westinghouse Air Brake Company and the Union Switch & Signal Company, arrived yesterday and spent a goodly portion of the day greeting many railroad friends whom he had not seen

in the Atlantic City environment for four years, having been obliged to miss the last convention because important duties kept him elsewhere. While others were enjoying Atlantic City breezes in comfort two years ago he was sweltering in Cleveland under the otherwise pleasant task of helping nominate the Republican Presidential candidate. In spite of his extended business interests, Mr. Humphrey has found time to participate actively in such important political matters, and to be keenly concerned about affairs dealing with civic improvement and cooperative business betterment. He has served as president of his home town Chamber of Commerce, Pittsburgh, and as a member of the United States Chamber of Commerce. He is also a member of the committee in charge of the program of the Y. M. C. A. Industrial Conference on Human Relations which will be held at Silver Bay, New York, in August.

Speaking of brides, W. H. Sitterly, general car inspector of the Pennsylvania at Buffalo, N. Y., past president of the Central Railway Club, and a member of the Executive Committee, is here with Mrs. Sitterly.

In the Grand March Thursday night, there were 594 people by actual count. The kaleidoscopic effect under brilliant light of the women's costumes was a wonderful feature in its radiance, with beautiful and diversified coloring effect.

Speaking of attendance at conventions, Harry D. Vought has thirty-nine to his credit. He is also serving his fortieth year as secretary-treasurer of the Central Railway Club, and his twenty-fourth as secretary of the New York Railroad Club and the Master Boiler Makers' Association.

H. W. Buse, special railroad representative of The Remington Typewriter Company, is quite active in radio broadcasting, speaking tonight from Station WHAR at Seaside Hotel, on "The Citizen's Military Training Camps." He is also on the Sesqui Centennial broadcasting committee. His record to date is 153 broadcasts on subjects of national interest.

The regular tournament of the McBarmma Golf League will take place at the Seaview Country Club today. The present indications are that in addition to having the usual handicaps the members will have an endurance test with the Jersey mosquitoes. One of the advantages of playing at Atlantic City in such delightful weather as this is that the mosquitoes always furnish a real alibi for bad scoring, in addition to the usual fictitious ones.

The mechanical officers of two of the New England railroads are seeing to it that their general managers are fully informed as to the high spots of the exhibit. W. O. Forman, mechanical superintendent of the Boston & Maine, with his associates, are conducting Vice-President and General Manager Pollock, while W. L. Bean, mechanical manager of the New Haven, is doing likewise with General Manager Droege. Incidentally, Mr. Droege is waxing enthusiastic over the several important pieces of equipment which the New Haven has in the track exhibit.

E. E. Nash, chief operating officer of the Minneapolis & St. Louis, who is attending the conventions, reports an improvement in general conditions in the Northwest. The Minneapolis & St. Louis belongs to the group of railways in northwestern territory which within recent years have had the most difficult conditions in the country to deal with. While, because of a combination of adverse circumstances, the Minneapolis & St. Louis has had hard sledding, Mr. Nash is gratified to be able to say that its operating and financial results are substantially improving.

P. R. Albright, vice-president and general manager of the Atlantic Coast Line, arrived yesterday to attend the conference on motor transport and to look over the exhibits. Mr. Albright was one of the American delegates last year to the congress of the International Railway Association in London.

D. W. Pye is attending the convention this year in a triple capacity. First, he is president of the Tuco Products Corporation, prominent as an exhibitor; second, he is vice-chairman of the Outing Committee of the New York Railroad Club which holds its third annual outing at Travers Island, Thursday, July 8, with a golf tournament in the morning. The chairman of the Outing Commitee, James S. Doyle, vice-president of the Interborough Railroad, is on his way here and expects to arrive today. Between the two of them, they expect to complete plans for the Railroad Club outing. And, finally, Dave in his usually obliging mood is checking up the results of the hard-working chairman of the Entertainment Committee, George Cooke, to see that everything is all right.

Albert C. Mann, vice-president in charge of purchases on the Illinois Central and the Central of Georgia, who is attending the conventions, has had his work made unusually heavy within very recent years because, in addition to these railways carrying on an extensive improvement program made necessary by the rapid growth of their business in the Southeast, the Illinois Central is making very large terminal improvements in the Chicago territory, including the electrification of its lines into Chicago. The electrification of its suburban lines, which is one of the largest projects of this kind ever undertaken, is nearing completion, and operation of the electrical installation will be opened in July.

Margaret Talbot Stevens, better known as "Aunt Mary" by the employees of the Baltimore & Ohio, arrived Friday to make a little study of the conventions. "Aunt Mary" is one of the editors of the B. & O. Employees' Magazine. She has just returned from St. Paul, where she attended the annual meeting of the American Railway Magazine Editors' Association. Just as "Aunt Mary" has put spice and ginger into the columns of her magazine, she has also been instrumental in enlivening the programs of the Magazine Editors' Association. It was no empty compliment or mere expression of courtesy that resulted in her election as secretary-treasury of the association. Rather, it was a well earned honor—all the more so because Aunt Mary is the first woman to be elected to an office in that organization.

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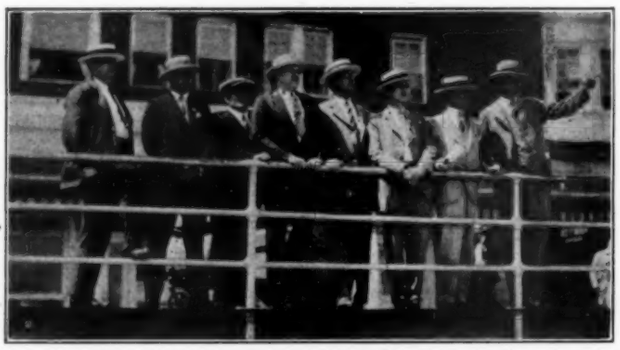
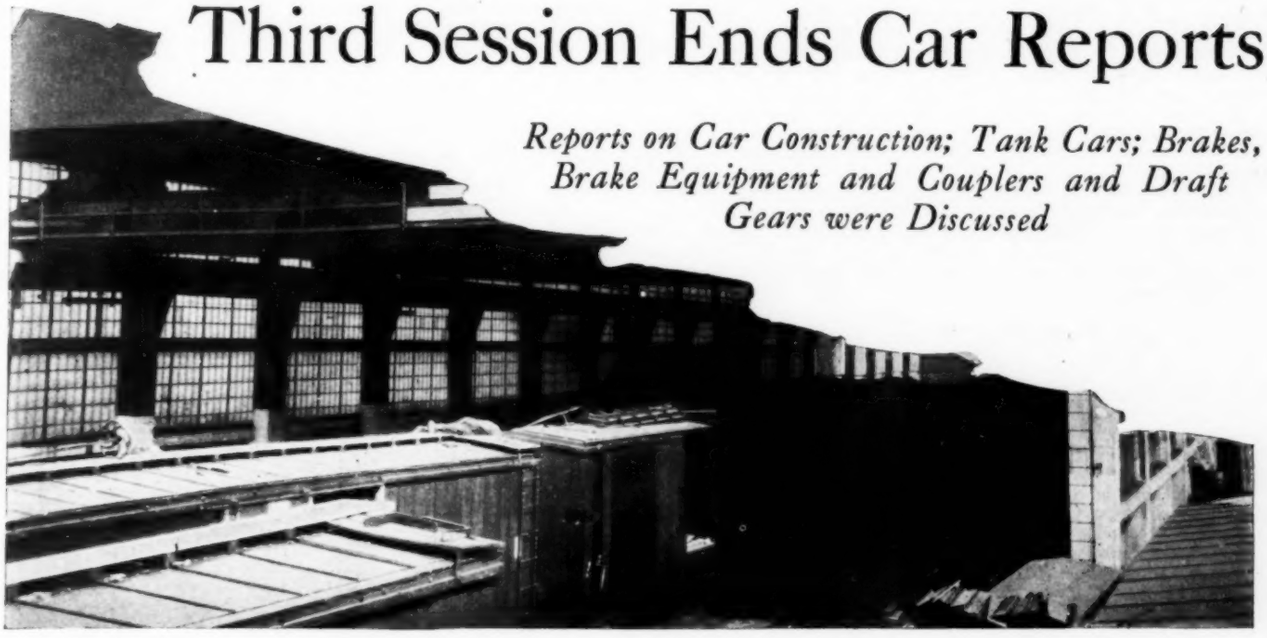


Chesapeake & Ohio Car Department Staff. Left to right: L. S. Ward, general car inspector; O. F. Weik, general car inspector; F. A. Starr, supervisor reclamation; E. C. Ellis, general passenger car inspector; Paul Maddox, superintendent car department; J. A. Roberts, special inspector; G. H. Taylor, general car inspector; W. E. Slack, general car inspector.

Third Session Ends Car Reports

Reports on Car Construction; Tank Cars; Brakes, Brake Equipment and Couplers and Draft Gears were Discussed



THE third session of the Mechanical Division was called to order by Chairman Wallis at 9.30 yesterday morning, after which the Report of the Car Construction Committee was read by Chairman Kiesel. The various sub-committee reports were read by the respective chairmen.

Report of Committee on Car Construction

W. F. Kiesel, Jr.
Chairman

The committee, in continuance of the work in recent years which resulted in the adoption of the standard 40 and 50-ton single sheathed box cars and the standard 40 and 50-ton double wood-sheathed box cars, has taken up and now submits tentative designs for standard automobile cars and for 50 and 70-ton self-clearing hopper cars. Progress is also well advanced on the design of standard stock cars. After an exhaustive survey, drawings of a brake beam hanger bracket and of loop and U-shaped hangers are submitted for recommended practice. Reports are also submitted on designating letters for various types of freight equipment cars and on specifications for fundamental calculations for the design of box cars. An elaborate series of tests of cast steel truck side frames is being conducted. A progress report is submitted and it is hoped that tests will be completed in time for the committee to make a full report next year. Other subjects considered, but not completed, include moisture content of lumber used in box car construction, standard dimensions for lumber used in car construction, box car ends, and hatches for refrigerator cars.

The designs of the 40 and 50-ton single sheathed box cars, class 4CXMI and 4DXMI, and of the 40 and 50-ton double wood-sheathed box cars, class 4CXM2 and 4DXM2 have been completed and detail designs of these cars, and of the trucks have been made to include all the features which were adopted by the action of this association.

Special subjects have been referred to subcommittees and their reports follow.

Subcommittee on Fundamental Calculations for the Design of Box Cars

Instructions were to prepare a list of revisions to date. As nearly all pages are affected, and most of them contain many changes, it was felt to be impracticable to make a complete compilation. Your committee, therefor, makes a progress report only, at this time, with the understanding that a meeting will be held at an early date to make all necessary changes in the report appearing as Appendix "A," in the report of the Committee on Car Construction, Circular D. V.—400.

Revisions in general are as follows:

PAGES 1 TO 8 INCLUSIVE

1—To procure a more logical arrangement of items.

2—To eliminate the load of 3,000 lb. against each end of bolster, as specified in paragraph 5-c.

3—Insert an additional clause, 6-c, providing for eccentricity in side truss members.

4—Change in maximum spacing of rivets in center sill, cross-bearers and bolsters from 16 times the thickness of the thinnest plate connected, as specified in paragraph 14, to read "Twenty times the thickness of the thinnest plate connected."

5—Insert additional item in paragraph 7 (unit stresses) to cover characteristics of material.

6—Eccentricity (page 8 of report).

In reply to the comment of the Car Manufacturers' Association, under this heading, the committee reported, as follows:

Latest investigations indicate that the bending moment due to eccentricity will not increase the unit stresses at the ends of the posts, which have been the critical locations. This is consistent with the assumption originally made, that with fixed end columns there is no bending moment due to eccentricity. With practically fixed ends, the bending moment due to eccentricity at the end is of opposite sign to the bending moment due to bulging. Also with partially fixed ends, or free ends, it will increase the stresses between supports, but probably not to an extent which would justify a change in the design.

It is the intention to submit at a later date additional data supporting this statement.

Pages 13 to 51 Inclusive

1—Reduction of 3 in. in distance between truck centers.
2—Revision of bending moments from bulging to clarify them regarding vertical pressure of 49 lb. per cu. ft.
3—Stresses in intermediate post DE with cross-section unreduced at side sill.
4—Stresses in front door post with weather strip continued to bottom edge.
5—Inclusion of formulas for computation of bending moments in post BC, and door post FG and F'G from pyramidal loads, and omission of all calculations prepared by the use of the influence line method. The influence line method was formerly employed because accurate formulas had not at that time been derived for pyramidal loads.

Pages 52 to 93 Inclusive

1—Revision of floor plank calculations to include weight of plank and to change size of plank from 2¼ in. to 2⅛ in., in accordance with standard lumber dimensions shown in A. R. A. Manual.
2—Change in properties of center sill section to conform with those published by Carnegie Steel Company.
3—Recalculation of center sill bending moments, reactions and deflection equations on account of reduction of 3 in. in the distance between bolsters.
4—The elimination of 3,000-lb loads at ends of bolsters, as shown on page 58.

Pages 95 to 104 Inclusive

The same revisions will be made as stated above.
It will be noted that the committee's report will have to be entirely rewritten. It is the opinion that the rearrangement and reprinting should be deferred for another year, because of other changes and suggestions which may develop.
The subcommittee report is signed by C. R. Harding (chairman), engineer of standards, Southern Pacific; P. W. Kiefer, chief engineer motive power and rolling stock, New York Central; L. K. Sillcox, general superintendent motive power, Chicago, Milwaukee & St. Paul; and A. H. Fetters, mechanical engineer, Union Pacific.

Subcommittee on Test of Cast Steel Truck Side Frames

Instruction to make tests of A. R. A. and U. S. R. A. 40 and 50-ton cast steel truck side frames were as follows:
A—On the dynamic testing machine designed and built for the T. H. Symington Company at their laboratory, Baltimore, Md.
B—On the dynamic testing machine designed and built for the American Steel Foundries at Granite City, Ill.
C—To make static tests on the Baltimore & Ohio 600,000-lb tensile testing machine in the Baltimore & Ohio laboratory at Mt. Clare shops, Baltimore, Md.

The subcommittee, on compliance with instructions, purchased from the Buckeye Steel Castings Company the following cast steel side frames for test:

3 A. R. A. 40-ton frames.
3 A. R. A. 50-ton frames.
4 U. S. R. A. 40-ton frames.
4 U. S. R. A. 50-ton frames.

And from the American Steel Foundries:

3 A. R. A. 40-ton frames.
3 A. R. A. 50-ton frames.
3 U. S. R. A. 40-ton frames.
3 U. S. R. A. 50-ton frames.

This is a progress report as there was not sufficient time to make tests on all the machines above mentioned. A report on the information established to-date would result in misleading comparisons, because there is not sufficient information available to compare the results of the tests on the Symington and American Steel Fundries' machines.

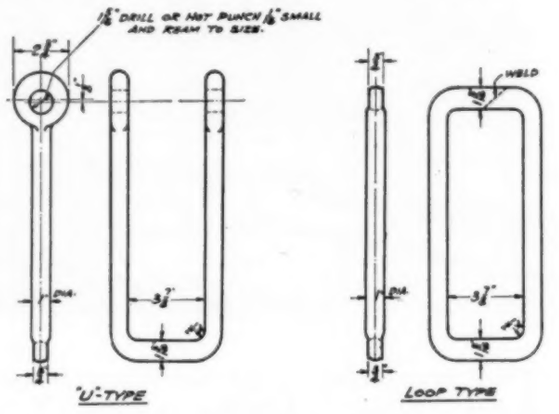

DRILL OR HOT PUNCH ⅝" SMALL AND REAM TO SIZE.
WELD
"U" TYPE
LOOP TYPE
HANGERS MUST BE FORMED AT TEMPERATURE SUFFICIENTLY HIGH TO PREVENT RUPTURE OR INTERNAL STRESS AT BENDS
BOTTOM SECTION OF "U" TYPE AND TOP AND BOTTOM SECTIONS OF LOOP TYPE HANGERS MAY BE ROUND OR INTERLOCKING

Fig. 2—Brake Beam Hangers

To-date, the following cast steel side frames have been tested to destruction on the Symington dynamic machine:

40-ton and 50-ton A. R. A. Buckeye Steel Castings Company. Twist test applied to bolster guide.
40-ton and 50-ton U. S. R. A. Buckeye Steel Castings Company. Twist test applied to bolster guide.
40-ton and 50-ton A. R. A. American Steel Foundries. Twist test applied to spring plank.
40-ton and 50-ton U. S. R. A. American Steel Foundries. Twist test applied to spring plank.

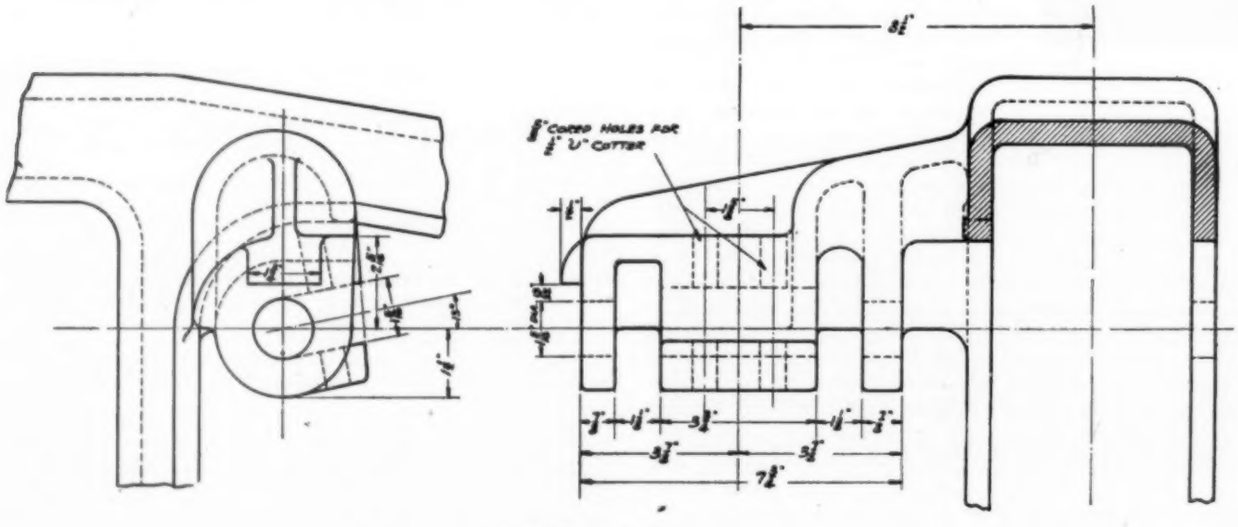


Fig. 1—Type A Bracket for Brake Beam Hanger

40-ton and 50-ton U. S. R. A. Buckeye Steel Castings Company. Twist test applied to spring plank.

The following cast steel side frames have been tested to destruction on the American Steel Fundries' machine:

50-ton A. R. A. American Steel Foundries. Twist test applied to spring plank.

The following frames remain to be tested on the American Steel Foundries' machine:

40-ton and 50-ton A. R. A. Buckeye Steel Castings Company.
40-ton and 50-ton U. S. R. A. Buckeye Steel Castings Company.
40-ton A. R. A. American Steel Foundries.
40-ton and 50-ton U. S. R. A. American Steel Foundries.

The following frames have been tested to destruction on the Baltimore & Ohio 600,000-lb. tensile testing machine:

40-ton and 50-ton A. R. A. Buckeye Steel Castings Company.
40-ton and 50-ton U. S. R. A. Buckeye Steel Castings Company.
40-ton and 50-ton A. R. A. American Steel Foundries.
40-ton and 50-ton U. S. R. A. American Steel Foundries.

These side frames are being tested to destruction in the following manner on the Symington and American Steel Foundries' dynamic testing machines:

40-TON FRAMES

Symington Machine	American Steel Foundries
Vertical Load	Vertical Load
Maximum 75,000 lb.	Maximum 78,000 lb.
Minimum 30,000 lb.	Minimum none.
60 applications per min.	50 applications per min.
Transverse Load	Transverse Load
9,000 lb. in and out.	10,500 lb. in and out.
12 applications per min.	100 applications per min.
6 in each direction.	50 in each direction.
*Center Twist Load	*Center Twist Load
6,000 lb. right and left.	7,000 lb. right and left.
2 applications per min.	50 applications per min.
1 in each direction.	25 in each direction.
Lenght of lever arm 38½ in.	Length of lever arm 58½ in.

50-TON FRAMES

Vertical Load	Vertical Load
Maximum 100,000 lb.	Maximum 100,000 lb.
Minimum 40,000 lb.	Minimum none.
60 applications per min.	50 applications per min.
Transverse Load	Transverse Load
12,000 lb. in and out.	13,000 lb. in and out.
12 applications per min.	100 applications per min.
6 in each direction.	50 in each direction.
*Center Twist Load	*Center Twist Load
8,000 lb. right and left.	8,500 lb. right and left.
2 applications per min.	50 applications per min.
1 in each direction.	25 in each direction.
Length of lever arm 38½ in.	Length of lever arm 58½ in.

The following loads are the same for all types of frames:

End Twist	None.
1 in throw of crank.	
12 end twist per min.	
6 in each direction.	
Center Impacts	None.
2,090 lb. weight.	
6¼ in. fall.	
12 impacts per min.	
End Impacts	None.
12 impacts per min.	
6 right and 6 left.	

*The center twist load applied either to spring plank or bolster guide of the frame.
†The center twist load applied only to spring plank.

The work of testing side frames on the American Steel Foundries' machine is still in progress and will continue until completed. While the date of completion of the tests on this machine is indefinite it is hoped that it will be in time to make a full report by the next annual meeting.

It is recommended that a vote of thanks be extended the T. H. Symington Company and the American Steel Foundries for use of and privilege given by them to the Association for the testing of these frames, and for the expense they have been put for the operation of their testing plants.

The subcommittee report is signed by J. J. Tatum (chairman), general superintendent car department, Baltimore & Ohio; John Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe, and A. R. Ayers, assistant to general manager, New York, Chicago & St. Louis.

Subcommittee on Brake Beam Hangers and Attachments

After an exhaustive survey of over 1,000 cars, we submit the following for Recommended Practice:

BRACKET

A bracket as shown on drawing and designated as Type "A." This bracket enables either a loop type or "U" type hanger to be used.

HANGER

The loop and "U" type hangers, as shown on drawing, to be made of mild rolled steel, or grade "A" cast steel, or the equivalent in strength. Hangers when made of mild rolled steel should be formed at a temperature sufficiently high to prevent rupture or internal stress at the bends. If loop type hanger is welded, the weld should be made on either end. For the "U" type hanger the eye should be forged and drilled to size, or hot-punched 1/16 in. small and reamed to size. Hangers when made of grade "A" cast steel must receive proper heat treatment and pin holes, if punched or cored, must have sufficient stock to ream clean and to size.

FASTENINGS

A ½-in. diameter "U" cotter to be used with the loop type hanger, as shown.

A square head pin with standard cotter, or threaded for nut as desired, to be used with the "U" type hanger.

LIMITS OF WEAR

Pins and hangers should be renewed when the minimum thickness is less than ⅞ in.

Total wear of bracket, hanger and pin combined should not exceed ½ in.

This subcommittee was instructed to confer with the Manufacturers Truck Committee, of which George G. Floyd is chairman, the two committees, in co-operation with each other, to revise the design to make it as satisfactory as possible for the purpose.

It is recommended that the design of the two hangers, and the general design of the bracket be submitted, to letter ballot, with the understanding that modifications in the design of the bracket on the line of improvement be made before the detail drawings are added to the Recommended Practice drawings.

The subcommittee report is signed by A. H. Fetters (chairman), mechanical engineer, Union Pacific; Ira Everett, general car inspector, Lehigh Valley, and K. F. Nystrom, engineer motive power and rolling stock, Chicago, Milwaukee & St. Paul.

Design of Box Cars

SINGLE SHEATHED BOX CARS AND STOCK CARS

This subcommittee has no formal report to present. It has carried out instructions to make modifications in the design of single sheathed box cars previously submitted to incorporate the features adopted as Recommended Practice, by letter ballot, and in collaboration with the subcommittee on Double Wood Sheathed Cars, to provide for maximum interchangeability of details. The resulting complete design is now presented as the approved Recommended Practice of this association. The design of stock car is well advanced but has been withheld pending further investigations of legal requirements.

DOUBLE WOOD-SHEATHED BOX AND AUTOMOBILE CARS

The subcommittee on Double Wood-Sheathed Box and Automobile Cars reports as follows:

Tracings illustrating the 40-ton and 50-ton double sheathed box cars have been brought up-to-date for publication in the Manual. Accompanying the drawings will be sheets covering general specifications and all information in regard to permissible alternates.

With reference to the double sheathed 40-ton and 50-ton automobile car design, the subcommittee desires to report progress, having prepared for submittal a general design having the same inside length and width as the double sheathed box car, and the inside height increased to the maximum permissible within the present A. R. A. clearance. This permitts an inside height of 9 ft. 3 in., but necessitates the use of bottom-hung doors exclusively, to remain within the clearance.

The car is based on 10-ft. side door opening. The question of making the clear door opening 12 ft., instead of 10 ft., for this design of car, will be submitted to letter ballot, with advice that the use of 12-ft. door will result in a heavier car.

Proper hoisting arrangements will be provided to meet loading and unloading requirements.

End doors are not included but are optional.

The box car underframe has been used, moving crossbearers to suit door post location.

In general, all details of the box car consistent with interchangeability are used on the proposed automobile car. This car, with

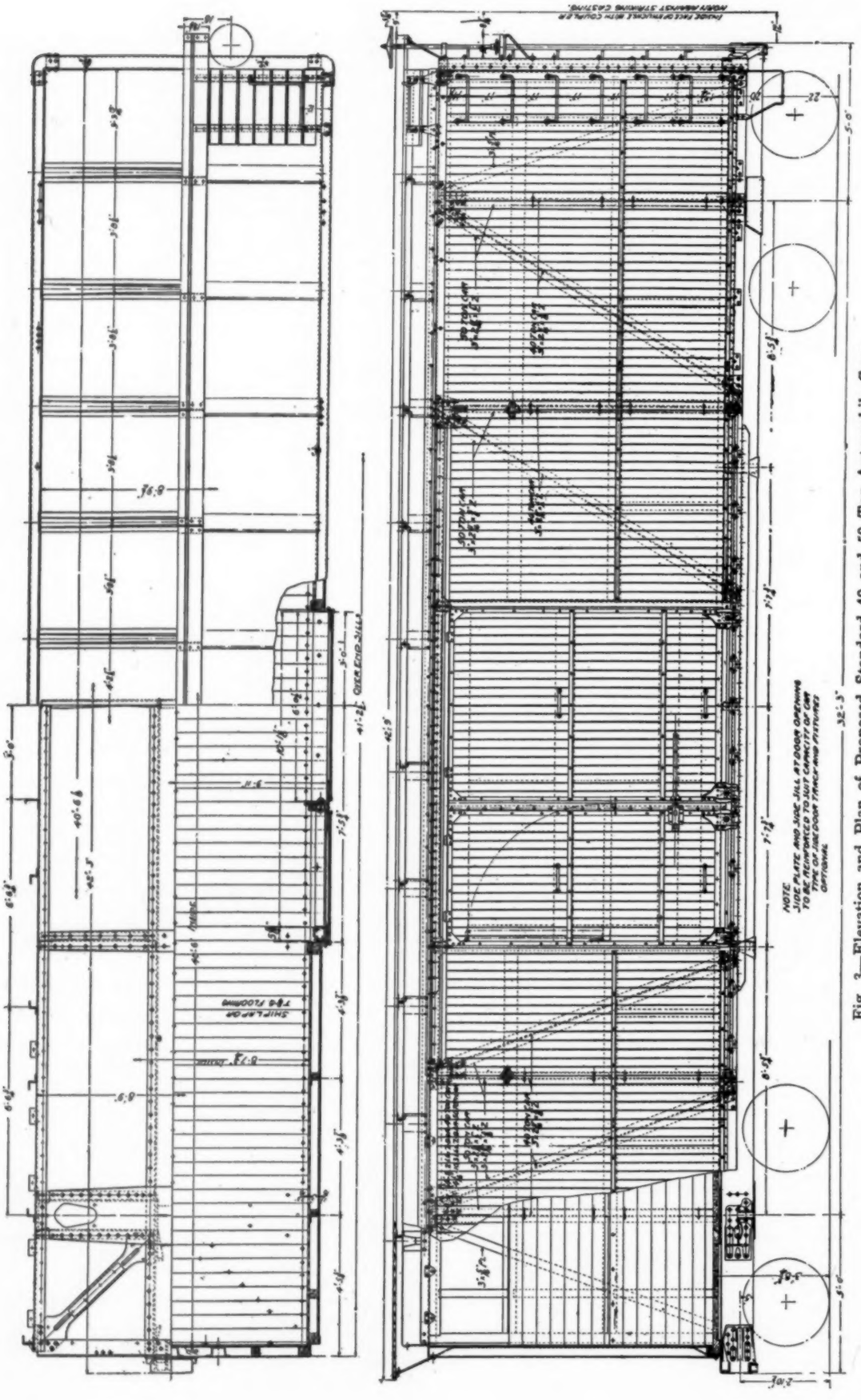


Fig. 3—Elevation and Plan of Proposed Standard 40 and 50 Ton Automobile Cars

a flat hand brake wheel, will meet unrestricted A. R. A. clearance conditions.

In addition thereto, the subcommittee has prepared for submittal a cross-section illustrating a larger automobile car for restricted service to meet the requirements of roads in certain territory. This car has an inside width of 9 ft. in., an inside height of 10 ft., and the question of the desirability of preparing A. R. A. design for such a car, together with the question of inside length (whether 40 ft. 6 in. or 50 ft. 6 in.), and side door opening (whether 10 ft. or 12 ft.) should be submitted to letter ballot.

The subcommittee report is signed by O. S. Jackson (chairman), superintendent motive power and machinery, Union Pacific, and John Purcell, assistant to vice-president, Aatchison, Topeka & Santa Fe.

NOTE: Instructions to the two subcommittees of design required that designs of all different kinds of house cars, which includes automobile and stock cars, be developed on the box car underframes, thereby providing a basis for maximum interchangeability of detail parts, hence reducing the requirements for stock on hand and the maintenance cost. In addition to this they were to provide sufficient information relative to automobile and stock cars of other inside dimensions, which the general service seems to demand, so that the members can indicate by vote whether the additional designs, exceeding the adopted limited outline for fright cars, hence for limited service, should be developed.

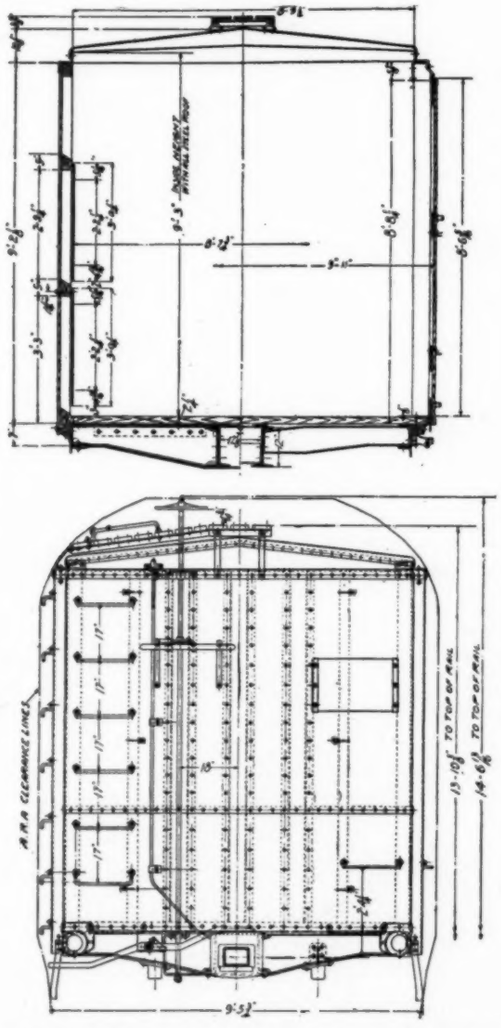


Fig. 4—End View and Section of Proposed Standard Automobile Cars

Moisture Content of Lumber Used in Box Cars

The subcommittee submits the following recommendations for adoption as Recommended Practice:

1—It is recommended that the moisture content in sheathing, lining for all-steel box cars, lining for double sheathed box cars, lining for refrigerator cars, and roofing manufactured from 1-in. rough lumber, when applied to car, must not exceed 10 per cent.

2—Horizontal lining for single sheathed cars, when applied to car, must not exceed 10 per cent.

3—Decking for house cars, when applied to cars, must not exceed 12 per cent.

4—Framing and running boards to be air-dried, as far as time will permit. Moisture must not exceed 20 per cent.

NOTE: Air-dried lumber cannot be expected to contain less than 15 per cent moisture, and it will take from four to twelve months to air-dry lumber. In kiln-drying lumber it is absolutely essential that relative humidity be maintained, but no hard-and-fast rule can be laid down on this point as lumber condition will govern. Drying lumber without humidity control causes stresses to be set up, and a big loss, by checking, warping, etc., will result.

The purpose of arriving at the proper moisture content in lumber is to obtain tight work, and at the same time not reduce the moisture content to the point where it will cause buckling, due to absorbing moisture, after lumber is placed in car.

The moisture content recommended is considered a maximum, from which good results will be obtained. This will not prevent any railroad from specifying a lower moisture content to suit prevailing local climatic conditions, and their season changes, as indicated by humidity report of the United States Weather Bureau, Department of Agriculture, copy of which appears, in an appendix to this report.

The full report (given in an appendix not printed here) shows considerable interesting data in connection with this subject.

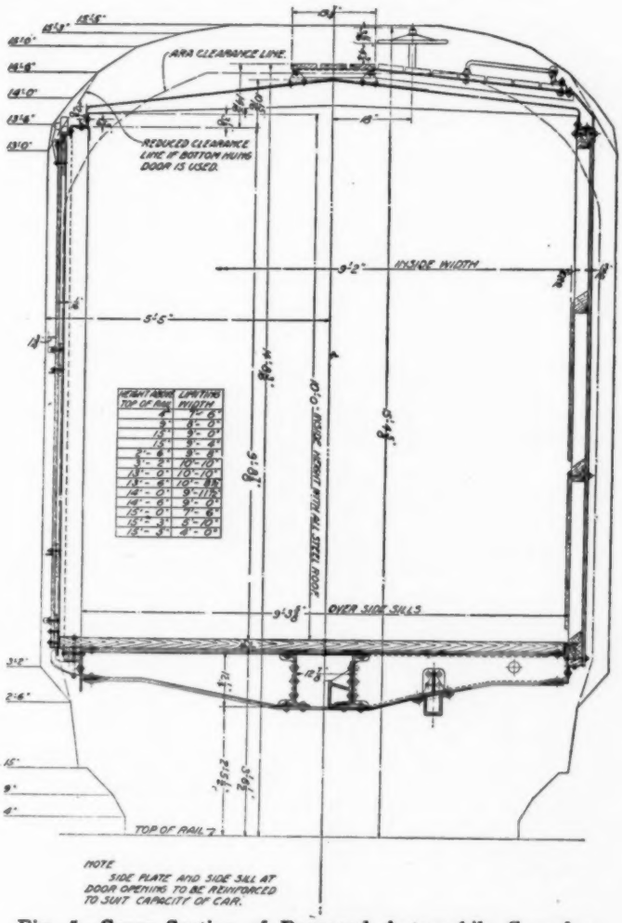

A.R.A. CLEARANCE LINE
REDUCED CLEARANCE LINE IF BOTTOM HUNG DOOR IS USED
INSIDE WIDTH
OVER SIDE SILLS
TOP OF RAIL
NOTE
SIDE PLATE AND SIDE SILL AT DOOR OPENING TO BE REINFORCED TO SUIT CAPACITY OF CAR.

Fig. 5—Cross Section of Proposed Automobile Cars for Restricted Service

The subcommittee report is signed by John McMullen (chairman), superintendent car department, Erie; L. K. Sillcox, general superintendent motive power, Chicago, Milwaukee & St. Paul, and J. J. Tatum, general superintendent car department, Baltimore & Ohio.

Report of Subcommittee on Self-Clearing Hopper Car

The subcommittee was instructed to proceed with the designs of the 4D (50-ton) and 4E (70-ton) self-clearing hopper cars, as follows: That, they should adhere to as many standards as possible that have already been made use of in the box cars;

the capacity is to be figured on 52 lb. per cu. ft.—2,500 cu. ft. for the 50-ton, and 3,000 cu. ft. for the 70-ton car—both to be figured with an average heap of 10 in.; and the width to be as large as adopted clearances will allow. As a result we have prepared designs of 50 and 70-ton cars shown on attached plates.

A letter from the Norfolk & Western requesting careful consideration of the use of a height of 11 ft. to top of sides was considered and by majority vote the height of 10 ft. 6 in. was adopted, to provide necessary clearance at coal tipples in the hard coal regions, and to avoid excessive height of center of gravity.

For the 70-ton cars, within these limitations, it was found that by placing the stakes inside and taking every other advantage of all available space, it was possible to make the 70-ton car sufficiently short to use the box car length of center sills, which, although not of prime importance, will be desirable. The length of bays was made 6 ft. 6 in. so that by omission of one bay, with the included hopper, the desired difference in cubical capacity of 500 cu. ft., between the 50 and 70-ton cars, can be realized, thereby permitting all details, except longitudinal members, being interchangeable. This loaded car will have the center of gravity about 6 ft. 4 in. from rail, and will weigh about 51,000 lb., or a ratio of light-weight to revenue load of more than 1 to 3. On the cuts showing this car alternate designs are presented for consideration, and several details are indicated as being optional.

The 50-ton car has the one bay omitted, but is of the same general design as the 70-ton car. This car will weigh about 44,000 lb.; and it will be noted that when the car is loaded to 169,000 lb. on rail the revenue load will be 125,000 lb. At 52 lb. per cu. ft., this represents 2,400 cu. ft. capacity, with a heap of 6⅝ in., and a ratio of light-weight to revenue load of 1 to 2.84. The same alternate designs apply to this car, but have been omitted from the drawing.

The subcommittee report is signed by W. B. Whitsitt (chairman), assistant mechanical engineer, Baltimore & Ohio, and B. S. Brown, assistant mechanial engineer, Pennsylvania.

NOTE: The general design of car is submitted for vote of the association, as to whether this general design is acceptable. Such acceptance carries with it the obligation on the Committee on Car Construction to complete the design in detail.

Furthermore, during the completion of the design, it will be the intent to submit the general design to the Eastern and Western Railroad Associations, for report as to patents which may cover that design, so that, when finally submitted, it can be accompanied by a statement covering patents which may be infringed.

Subcommittee on Amplification of Definitions Designating Letters for Car Equipment

The subcommittee has considered various communications relative to further amplification of definitions and designating letters for car equipment and has met with the committee on Records of the Transportation Division in discussing these matters. It was the unanimous opinion of both committees that the present designating letters and definitions should be disturbed as little as possible, as they have been in effect for a considerable number of years and are generally well understood.

It was decided, however, to recommend some few changes to clarify present definitions and also to take care of types of cars which have come into existence during recent years. Your subcommittee submits a report covering its recommendations for revision and amplification of the present recommended practice.

[The report shows in parallel columns all classes of freight equipment in present and proposed forms. There is considerable improvement in the wording of the descriptions of the various classes but this is omitted.—Editor.]

The following new classes are provided for:

"GH"—An open top car, having fixed sides, drop ends and drop bottom, consisting of doors hinged at center sills to dump outside of rails.

"HE"—An open top car, having fixed sides and ends; and bottom consisting of hoppers dumping between rails and not self-clearing.

"HF"—An open top car, having fixed sides and ends equipped with cross hoppers dumping between rails; also a side dump hopper extending from end of car to bolster dumping outside of rail.

Class "L"—Special car type.

"LO"—A self-clearing, permanently enclosed car, having roof, sides and ends fitted with openings in roof for loading and having weather-tight covers, also opening in bottom for unloading having tight fitting covers or doors to prevent leakage.

"BT"—A closed car insulated throughout, having sides, ends and roof with side doors. Fitted with hatch plugs and with suitable means of retaining and drawing off briny waters; also fitted with suitable containers for carrying liquids in bulk.

"FT"—(It developed in a check of the Railway Equipment Register that the question of brine and pickle tanks on flat cars should receive further consideration because of traffic features.)

(Instead of providing specific designations for gondola and hopper cars equipped with coke racks, it would appear advisable that the following note be added to designate this special class of service and the designations as "GC," "GF" and "HC" be eliminated:)

Note 1—If any of these gondola or hopper cars are equipped with coke racks the letter "C" should be affixed to the regular symbol to designate its special class of service.

(Inasmuch as it is possible to apply a covering or roof to a gondola or hopper car for protection of contents it would appear advisable that a note to this effect be added to designate this special class of service, as follows:)

Note 2—If any of these gondola or hopper cars are equipped with a roof or are covered for protection of contents the letter "R" should be affixed to the regular symbol to designate its special class of service.

Subcommittee on Lettering and Marking Cars

At the meeting of the division held at Chicago in June, 1925, the recommendations contained in the report on Lettering and

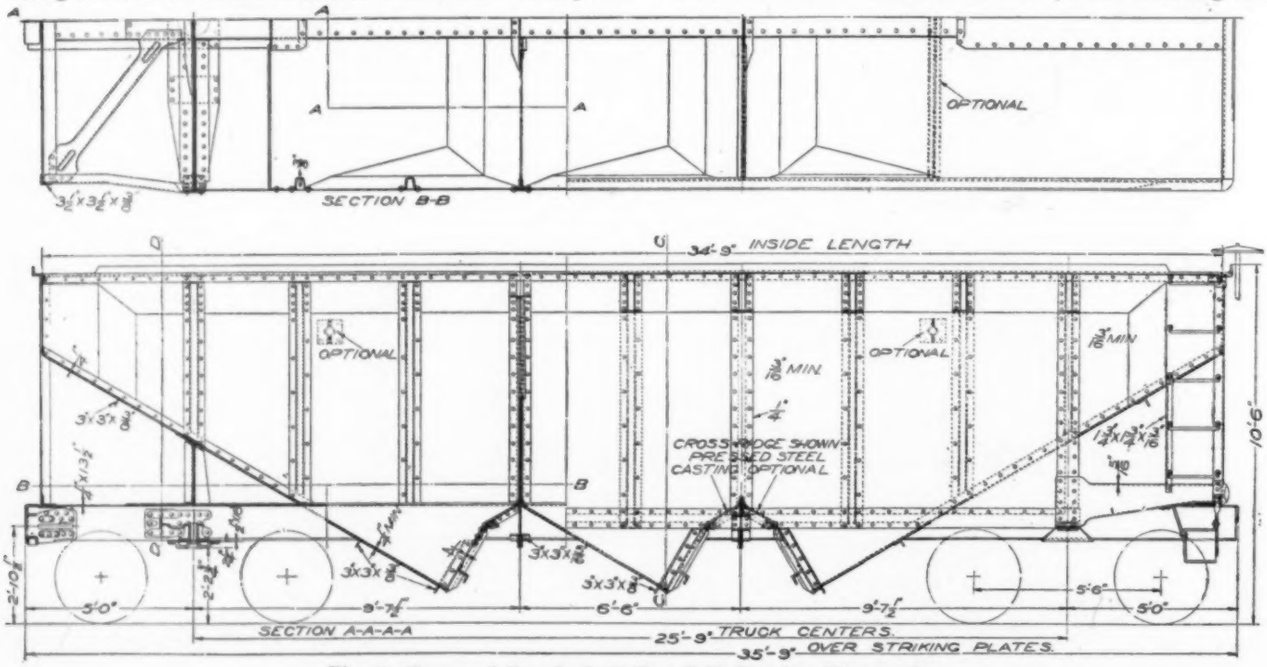


Fig. 6—Proposed Standard 50 Ton Self Clearing Hopper Car

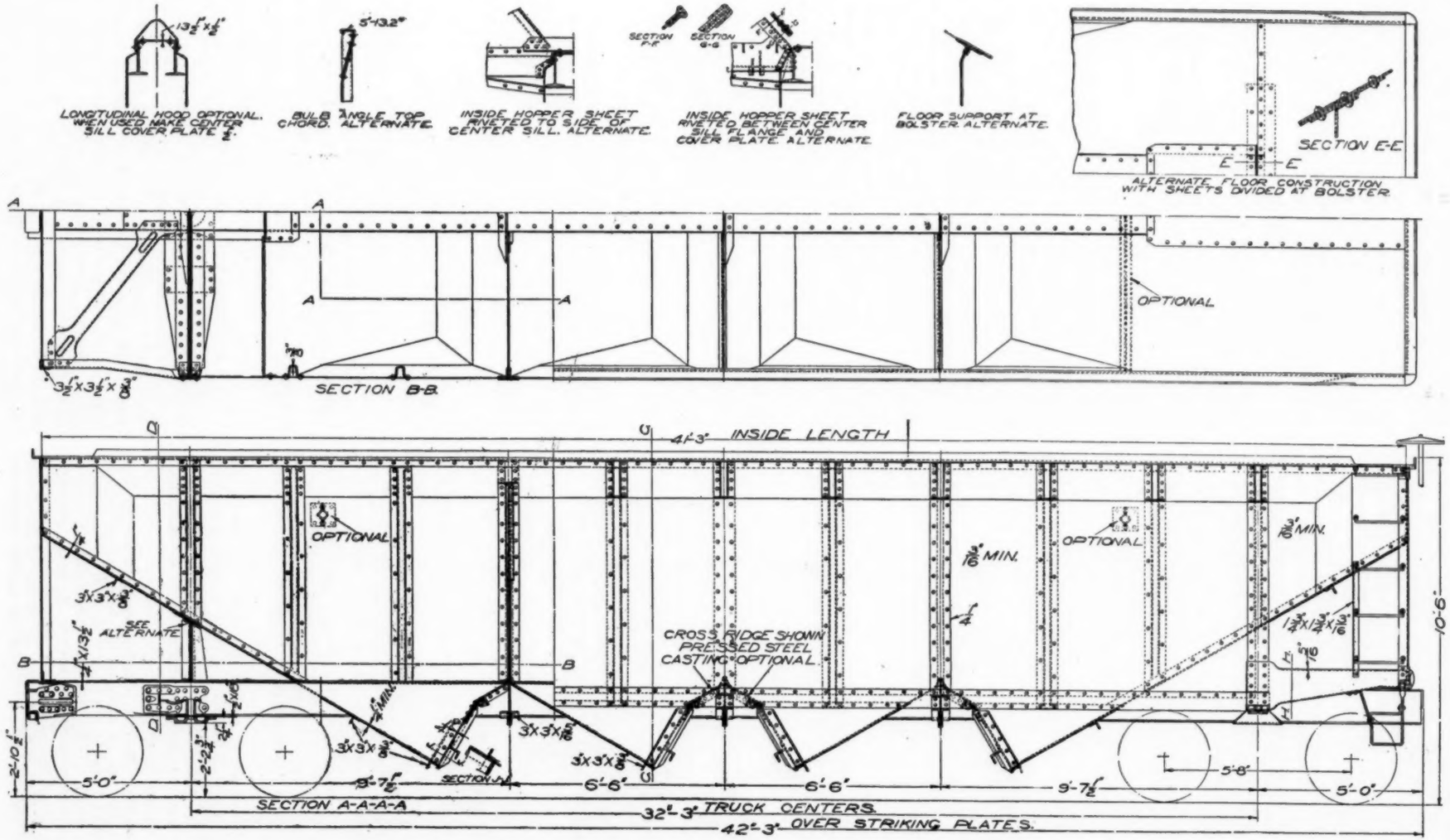

LONGITUDINAL HOOD OPTIONAL. WHEN USED MAKE CENTER SILL COVER PLATE
BULB ANGLE TOP CHORD. ALTERNATE.
INSIDE HOPPER SHEET RIVETED TO SIDE OF CENTER SILL. ALTERNATE.
SECTION F-F
SECTION G-G
INSIDE HOPPER SHEET RIVETED BETWEEN CENTER SILL FLANGE AND COVER PLATE. ALTERNATE.
FLOOR SUPPORT AT BOLSTER. ALTERNATE.
SECTION E-E
ALTERNATE FLOOR CONSTRUCTION WITH SHEETS DIVIDED AT BOLSTER.
SECTION B-B
OPTIONAL
41'-3" INSIDE LENGTH
CROSS RIDGE SHOWN PRESSED STEEL CASTING OPTIONAL
SEE ALTERNATE
SECTION A-A-A-A
32'-3" TRUCK CENTERS.
42'-3" OVER STRIKING PLATES.

Fig. 7—Elevation, Plan and Details of Proposed Standard 70 Ton Self Clearing Hopper Car

Marking Cars were submitted to letter ballot. This ballot failed to carry, some of the members preferring the use of 3-in. letters and figures for light-weight and station marking, in place of 4-in. letters and figures, as shown on Plate 1. Accordingly, another Letter Ballot was issued including such a proposition. The vote on this letter ballot was inconclusive. This added proposition, however, did receive a majority vote.

The committee then revised the plate, to conform to the proposition which received a majority vote, except that the letters and figures for load-limit, light-weight, and station marking were placed on the same horizontal lines respectively, and that no spaces were provided for alternate locations when repainting and restenciling cars, and submitted it again to letter ballot, to which were added Plates 2, 3 and 4, showing lettering and marking of flat, gondola and hopper cars.

All four propositions carried, and will, therefore, be inserted in the Manual, as standard practice for lettering and marking cars.

Since this letter ballot was voted on, the committee's attention has been called to Note 5 on Plate 1, which reads as follows:

"Width and height at eaves shall be shown only on cars that will not pass A. R. A. clearance diagrams."

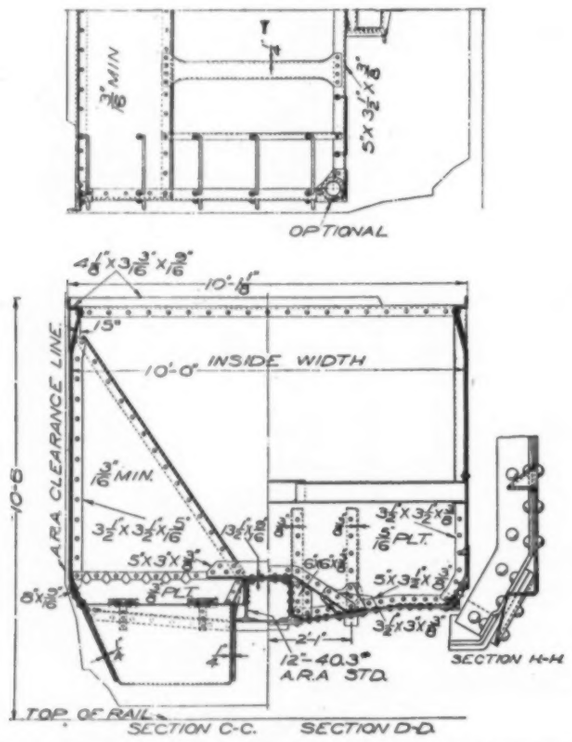


Fig. 8—Sections of Proposed Standard 70 Ton Hopper Car

Some roads have clearances which are smaller than the A. R. A. clearance diagram, and it is, therefore, recommended that Note 5 be removed, and that the following note be put in its place, to comform to item No. 13, page 38, section "L," of the Manual:

"On all box or other house cars, standing more than 12 ft., from top of rail to eaves, the height and width at eaves is to be stenciled as shown. Where latitudinal running board is flush with eaves, the height should be given to top of latitudinal running board."

It is also recommended that Notes 7 and 8, on Plate 1, and Notes 6 and 7, on Plates 2, 3 and 4, referring to cylinder marking, be reduced to one note, and to read, as follows:

"Stenciling to conform to instructions shown in Interchange Rule No. 60."

And that, since Rule No. 60, and the interpretation of Rule No. 60, provides for size of marking, the reference to cylinder marking be removed from third line of Note 1 on all four plates.

Attention was called to the fact that "repacked" marking is not located in accordance with standard A. R. A. requirements, item No. 4, page 37, section "L," of the Manual, and it is, therefore, recommended that these markings be shown in the correct location, and that the abbreviation "Repkd" be further abbreviated to "Rpkd."

It is also recommended that the following note be added to stenciling drawings for house cars, gondola cars, and hopper cars:

"Information regarding triple valve, coupler shank, coupler attachments, brake beams, steel wheels, centrifugal dirt collector, etc., must not be stenciled on side of car, but may, if owner desires, be stenciled on ends of cars."

The subcommittee report is signed by A. R. Ayers (chairman), assistant general manager, New York, Chicago & St. Louis.

Other Subjects

Other subjects on which this committee, or rather subcommittees thereof, have had under consideration, and on which we report progress, are:

(*a*) *Specifications for Physical Requirements of Box Car Ends*—This subcommittee has spent considerable time on tests of box car ends, with the intent of developing fundamental data on which a specification can be predicted.

(*b*) *Standard Design of Hatch Openings and Bevels for Matches for New Designs of Refrigerator Cars*—This subcommittee has been in touch with the principal refrigerator car lines, and, with their co-operation, have developed and are now testing the results of their deliberations.

(*c*) *Standard Dimensions for Lumber Used in Car Construction*—This subcommittee has gone into this subject quite fully, and have tentatively agreed on dimensions, based on the adoption of a limiting moisture content, as well as when, how and where that moisture content shall be determined. The dimensions given shall obtain when the lumber contains the moisture content specified.

The report of the committee on Car Construction is signed by W. F. Kiesel, Jr. (chairman), mechanical engineer, Pennsylvania System; A. R. Ayers (vice-chairman), assistant general manager, New York, Chicago & St. Louis; O. S. Jackson, superintendent motive power and machinery, Union Pacific; C. L. Meister, mechanical engineer, Atlantic Coast Line; J. McMullen, superintendent Car Department, Erie; John Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe; W. O. Moody, mechanical engineer, Illinois Central; J. A. Pilcher, mechanical engineer, Norfolk & Western; P. W. Kiefer, chief engineer motive power and rolling stock, New York Central; C. B. Smith, assistant to mechanical superintendent, Boston & Maine; S. O. Taylor, master car builder, Missouri Pacific; Ira Everett, general car inspector, Lehigh Valley; W. A. Newman, mechanical engineer, Canadian Pacific; G. S. Goodwin, mechanical engineer, Chicago, Rock Island & Pacific; F. W. Mahl, general purchasing agent, Southern Pacific; J. J. Tatum, general superintendent car department, Baltimore & Ohio, and L. K. Sillcox, general superintendent motive power, Chicago, Milwaukee & St. Paul.

Discussion

During the reading of the subcommittee report in regard to the tests of A. R. A. and U. S. R. A. cast steel truck side frames, J. J. Tatum (B. & O.) made the following remarks concerning the next to the last paragraph of the report:

"That is rather doubtful in a way, and I doubt whether or not any of you have an idea of what this test represents. It is more than we anticipated, more than we expected, under all or any conditions. The test has brought out more information than we had hoped to get. We are still finding new conditions, and we expect to continue until the test is completed.

After we are through with the machines, it is a question that has to be decided as to which machine more nearly represents the service condition under which these frames are subjected."

The following paragraph was substituted for the third paragraph of the report of the Subcommittee on Self-Clearing Hopper Cars:

"There will also be included in the letter ballot covering the vote on the 50-ton and 70-ton cars, three lengths and heights of each capacity car representing short, medium and long designs. The height from the rail to the top of the side will be shown as 10 ft. 6 in., 10 ft. 8 in. and 11 ft. The width of all cars to be the same as shown on the general drawing in the report. Lengths to be such as to provide a capacity of 3,000 cu. ft. for the 70-ton car and 2,500 cu. ft. for the 55-ton car, including the space occupied by a 10-in. average heap.

"With these figures for each car will be included esti-

mated light weight, gross weight, total weight of load, calculated height of center of gravity for loaded car. Also, figures showing the coupled length of trains of 6,000 gross tons made up of each of the three sizes of car.

"A statement will be included showing the rate of increase in height of center of gravity, accompanying increase in the height of cars from the rail to the top of the sides and figures showing the rate of decrease in coupled train lengths accompanying the increase in the height from the rail to the top of the sides."

In presenting the report of the Subcommittee on Lettering and Marking Cars the chairman recommended that the last note of the report be changed to read as follows:

"When the owner desires information regarding triple valve, couplers, coupler attachments, brake beams, steel wheels, centrifugal dirt collector, and so forth, shown on cars, such information be stencilled on the ends of cars, if possible."

The purpose is to get as much marking off of the side of the car as possible.

G. W. Rink (C. R. R. of N. J.): I would like to raise a question of whether the side projection of the bracket is correct in that it does not show a full opening for the loop type hanger. Likewise, whether the holes for the ½-in. cotter do not line up too closely with the top rib so as to prevent the application of the cotter?

A. H. Fetters (U. P.): As stated in the report, the notes concerning the hanger and the bracket are to be revised before they are included in the manual. You are correct in stating that the projection is not correct, in that the dotted line shown should be solid. There is a slight interference on the entering of the key because of the rib. That will have to be taken care of.

W. H. Clegg (C. N.): Under the limits of wear, the second paragraph reads: "The total wear of the bracket, hanger and pin combined should not exceed ½ in." Does that include the wear on the head?

Mr. Kiesel: It includes the wear on the head.

Mr. Clegg: If that is the intention it should be so stated.

Mr. Kiesel: It was intended to state all the wear that exists in either the top or bottom.

Moisture Content of Lumber in Box Cars

F. W. Brazier (N. Y. C.): Do I understand that the moisture content is to be determined at the time it goes into the car?

Mr. Kiesel: The intent is that the moisture content should be determined at the time or within 24 hr. of the time it goes into the car, so that it absolutely represents the lumber that goes into the car.

Report on Self-Cleaning Hopper Cars

Mr. Rink: The design of the 50-ton hopper car looks as though it is predicated on using as many parts of the 70-ton car as possible. I believe the U. S. R. A. type of car is preferable, wherein we use two doors, which is sufficient for a 50 or 55-ton car. The use of a top Z-bar is not practicable, and should not be shown at all for the reason that when these cars are used on coal dumpers the top member of the Z-bar will not stand up. The application of Z-bars to hopper doors is not practicable as the space from one door to the other is too great and is bound to buckle in the center. It would be better practice for the committee to show two channels back to back. There will be so few 50 or 55-ton hopper cars built that the committee may overlook spending any time on a design of a 50 or 55-ton car for the reason that for such roads as the Jersey Central, if we should buy any 50 or 55-ton cars, it would be to our advantage to make them similar to the last lot of cars in order to avoid another set of patterns.

Mr. Kiesel: Mr. Rink answered his own question. We thought that so few will build 55-ton cars and, furthermore, the cubic capacity of this car, as given to the subcommittee, of 2,500 cu. ft., was such that you could not make a two-hopper car with that cubic capacity. I suppose the cubic capacity is about 2,000 cubic feet.

Mr. Rink: Our 50 and 55-ton cars run about 34 ft. in length and the slope of the sheets is about 27 deg. in place of 30 deg. The cubic content is 2,000, based on the hauling of anthracite coal, which runs closer to 58 to 60 lb. to the cu. ft. as compared with the figures shown in the reports.

Mr. Kiesel: That is what I assumed, that there will be only 2,000 cu. ft. while the requirement sent to the subcommittee was 2,500 cu. ft. If you wanted to get down to 2,000 cu. ft., you could shorten this and reduce the total length to 29 ft. 6 in.

Mr. Rink: The point I want to bring out is that we do not want any more openings to look after and to protect than is absolutely necessary.

Mr. Kiesel: If you want a 2,000 cu. ft. capacity car you can omit it, and have a lighter car than you have and then you will have a car equivalent to your own car in cubic capacity as well as lighter and stronger.

Mr. Brazier: The advisable design on this gondola car is to use the standard length of sills in box cars. We found in the construction of the postal cars, which are under postal laws, that it was advisable for us to build our baggage cars the same length of sill, to save carrying two kinds of stock.

Mr. Kiesel: We did use the standard length of box car sills in this car, the 70-ton car, and we arranged all the details so that the longitudinal bars would be the same for both the 55-ton and 70-ton car. The height was made 10 ft. 6 in. At the committee meeting yesterday, it was agreed to submit to letter ballot a statement as to the dimensions of the car to be made 10 ft. 6 in., another type 10 ft. 8 in., and another type 11 ft. high, calling attention to the effect that has on the center of gravity, and submit it to vote, so that this association can instruct the committee how to proceed. But the car as shown utilizes the box car center sills for the 70-ton car.

A. G. Trumbull (Erie): I would like to inquire whether or not the patented features of this design have been investigated so it may be assumed that there may be no risk in infringement?

Mr. Kiesel: They have not been investigated, as indicated in the footnote. After modifications that this association will inflict on us, the final results will be submitted to the eastern and western associations.

Mr. Tatum: The patent features in connection with this proposed car were first thought to be rather conflicting, but since we have gotten into it, about two conflictions remain. It is probable that they will be eliminated before the standard car is decided on.

The Z-bar on the top edge of the car was made use of in order to avoid possibility of infringement. The strength of that Z-bar is sufficient to meet any condition it may be subjected to.

The method of holding the doors closed on the car, has been investigated and cleared up. As to the inside stakes of the car, I do not know where that will end. The only possible conflict might be in the offset of the end and the ladders and grab irons set back.

R. B. Risbridge (P. & R.): Six feet to 6 ft. 4 in. heretofore has been the accepted margin of safety in connection with an important feature, center of gravity.

Engine tenders have been increased in length to get a lower height for the sole purpose of lowering the center

of gravity in order to avoid derailments. Rail lengths of 30 to 33 and 39 ft., also spring capacity must be considered as vital points.

The center of gravity up to 7 ft. may and has been successful, but track conditions and maintenance were contributing factors.

The recommendation in connection with height of the car has been on a basis of 6 ft. to 6 ft. 4 in. for the center of gravity. My remarks are based on the theory that one inch in height would decrease the length of the car 5 in. In regard to cubical capacity, I find some roads base this on a level load while other roads include a top out of 9 to 24 in., and apparently lose sight of the fact that the weight on the rail and a restricted width and height must be considered.

It is a difficult matter and a problem to work up a design of car that will meet the individual requirements of all roads. The acceptable design of all cars should be sufficiently flexible in detail to meet the requirements of most roads without changing the entire design.

In regard to the proposed designs submitted for consideration, it is noted that quite a radical change has been made from the usual design and incorporated in the recommendation; what I refer to is inside side stakes in order to obtain a greater width of car, and the introduction of a third hopper in the 50-ton car design, also the 15 deg. set in the side sheets near the top to provide clearance for top coping angle or cord, and the short outside stakes. Further thought should be given this departure from the usual previous practice in design.

Corrosion and mechanical action, especially at seams, due to loading of different kinds of coal, bituminous, anthracite, etc., are features for consideration, and the adoption of inside stakes provides additional seams, which are avoided by the outside stake design. The top coping angle, with upward protruding flange, may not be desirable on account of damage inflicted by the clamps on dumping machines. Alternate design of bulb angle top cord would likely be more preferable. Again, damage to side of car is likely to occur on dumping machines where protection is now given with outside stakes.

One of the great items of cost in hopper car maintenance is hopper doors and attachments, and there is some doubt in my mind as to whether a third hopper in the 50-ton car is either required or warranted.

The arrangement of hopper design, however, with the 70-ton car is more preferable to that of the 70-ton U.S. R.A. hopper car, especially so from the fact that each of the four sets of doors can be operated individually.

Another feature in hopper door design, which would be a decided advantage, is a door of symmetrical design; one which could be used on either side of the car, right or left, which would avoid carrying two types of doors in stock, and also facilitate repairs. This feature could easily be incorporated and the loss in carrying capacity, though slight, could be taken care of elsewhere.

The absence of a bottom chord or side sill is noticeable and worthy of further consideration. While the designers have, no doubt, considered this, I am in favor of the bottom chord, irrespective of the fact that hopper side sheet construction might be more difficult.

Mention should also be made of the angle end sill construction, as well as the pressed steel side sill extension. Hopper cars on many roads, including the Reading, are subjected to a great deal of poling or ramming in classification yards, etc., and the corner and end sill construction should be very substantial, bearing in mind it is also desirable to keep the light weight of the car down to a minimum consistent with the service for which the car is intended.

The interchange of parts may be desirable where practicable. However, if it should require the application of additional features, such as hoppers, etc., in order to make the parts interchangeable, the question as to whether it is warranted must be considered, and probably a 50-ton car with two hoppers could be designed, that with the application of two additional bays and longitudinal members of greater length, a 70-ton car could be obtained, and this would seem to be more preferable than the proposed design.

While it may be desirable to have center sills for the 70-ton car of the same length as the box car, this should in no way influence the committee if a more preferable design can be obtained.

One more important feature in connection with the outside stake design is the setting in of the side sheets at diagonal corners of the car to provide side ladder clearance. This feature is covered by patents and should be given careful consideration, as well as all other patented features before being incorporated in the design.

The length of both cars should be as short as possible, consistent with the restricted height and required cubical capacity based on 52 lb. per cu. ft., as contained in the instructions.

Mr. Kiesel: The point Mr. Rasbridge brought out in regard to the cubic capacity has been considered by the subcommittee. This design of car is based on a bay length of 6 ft. 6 in. For the cubic capacity that the hard-coal carrying roads have adopted, 2,000 cu. ft., this will be a two-hopper car, and although it did not say it in the report, it will be a shorter car than any I know of. Therefore, it could be made a two-bay length, three-bay length and four-bay length, and the same conditions would be used throughout for all three cars except the longitudinal members.

In regard to the Z-bar at the top, Mr. Tatum told us that the bulb angle situation has been cleared up. The reason for using the Z-bar was because that feature was involved in the patent. However, the bulb angle is cleared up for the 70-ton car. If the Z-bar is ¾ in. thick, the clam-shell bucket won't damage the Z-bar.

J. McMullen (Erie): We found it necessary to work these designating letters out with the Records Committee as tariffs enter into the designating letters.

Moisture Content of Lumber Used in Box Cars

Mr. Rink: I recently had a discussion with a representative of a car company with reference to the finished width of inside lining and width of flooring as covered by the A. R. A. tentative design of box cars, wherein the specification calls for a finished width of 5¼ in. He claimed that due to the low moisture content, using 6-in. lumber, he cannot finish flooring to 5¼ in. and line it to 5½ in. The flooring will finish closer to 5⅛ in. and the lining to 5 in.

Has the committee any information on that subject? We are about to have some cars built and I specified the 5¼-in. width, and it looks as though I would have to come down a little on the width of the lining and the flooring.

Mr. Kiesel: Lumber men claim that they can't make it 5½-in. wide finished. Designs have been made where lumber 5⅛ in or 5¼ in. can be used. Five and one quarter-inch can be obtained at times but most of the lumber dealers will only give 5⅛ in.

That will be cleared up when we give you the new dimensions for the lumber next year, which, no doubt, will be 5⅛ in. It is almost impossible now to get 5¼ in., but the designs as submitted by the subcommittees are so arranged that either 5¼ in. or 5⅛ in. will fit.

Mr. Rink: How about 5 in.?

Mr. Kiesel: I don't know of any lining of 5 in.

Mr. Rink: The question was raised that due to the poor

quality of the material coming through, that 5 in. is nearer the correct width than 5⅛ in. due to the warping of the timber when drying.

Mr. Kiesel: It is on account of such conditions that this committee is not prepared at this time to give new dimensions for lumber, but they will give that next year to this convention.

Mr. Brazier: I move, this being a standing committee, that the report be accepted as a progress report, and all matters that pertain to letter ballot be submitted to letter ballot.

(The motion was carried.)

Mr. Kiesel: I want to call your attention to the last paragraph of the report of the Subcommittee on Side Frames:

"It is recommended by the Subcommittee that a vote of thanks be extended to T. H. Symington Company and the American Steel Foundries, for use of and privilege given by them to the Association for the testing of these frames, and for the expense they have been put for the operation of their testing plants."

The Importance of Co-operation Between the Government and the Railroads

By Frank McManamy

Interstate Commerce Commissioner

It has been 27 years this month since I began attending the meetings of the Master Mechanics and Master Car Builders' Associations. During all of those years I have attended those meetings largely as a student because nowhere can a man who is interested in the important matters relating to the operation of railroads get more first hand information and keep up to date than modern methods than from this association made up of the men who have made a success of their work, and that can be obtained at these conventions.

I am a member of numerous organizations of railroad men, because like many of the men I see before me I began my railroad career,—to use a railroad phrase, "Polishing the wooden end of the shovel," and therefore, I know the needs for an association of this kind.

Organized in 1869, or about then, it, like other organizations, grew from necessity. It came because there was a need for it. In the early days of railroading, when equipment was kept on its own line, organizations of this kind were unnecessary, but with the interchange of equipment, with the demands for wider movement of cars, and better transportation service, the need for a comprehensive code of rules governing the interchange of cars became a necessity. This organization largely grew out of that necessity.

Considering all of the different organizations of railroad men, this is the most essential to uninterrupted and efficient service. This association originated and kept up to date the rules under which at the present time about two and a half million freight cars move from railroad to railroad and from place to place throughout the country. They are maintained under a system of standardization which has grown to a marvelous degree of perfection, and they are loaded under certain rules that insure safety as well as efficiency, and are returned to their home road in accordance with their rules,—sometimes.

However, that is a matter over which this association has no control. Therefore, I do not propose to criticise it, because whatever shortcomings the other fellow may have, I have always believed in the policy of telling them to him directly.

Under the Transportation Act, the Commission is charged with a great many responsibilities, and when I face many of the difficulties which we have before us and try to solve some of the problems in connection with the perfecting or aiding in the perfection of our wonderful transportation system, I am often reminded of the sign that they had on the platform of the dance hall in Leadville in the early days which read:

"Please don't shoot the fiddler, he is doing the best he can."

We find in many instances that railroad regulation is criticised, and as a result of that government ownership is held up before you either as a threat or a promise depending upon the viewpoint of the man that you are talking to. But my experience has been that the American people do not care much who owns the railroads or who operates them as long as they receive efficient service, and that is your job; so that the whole matter is in your own hands.

Whatever may be the future of the railroad industry in the country, I have never lost faith in its ability to go forward, because it has gone forward at a rate during my short experience with it that has made it difficult for me, at least, to keep pace with it. And whatever problems they may have in the future, I have sufficient confidence in the ability of the men who are operating the railroads and doing this work to meet them.

The railroad business is going to go ahead, and when we think of the fact that during the past year there have been records of carloadings, a million a week, it does not mean much any more. It is easy to say, but when we think of an organization that is built up to handle that; when we think of the car miles that have increased, ton miles, and all of the other efficiencies that have been developed in the railroad service, I want to say that the railroad industry as an industry has no cause to worry, no cause to fear anything, and much to be grateful for.

The Interstate Commerce Commission is charged with a multitude of duties. We have, under the Transportation Act, to provide rates that will yield a reasonable return on the capital invested. That is a difficult job, but coupled with that duty of the Interstate Commerce Commission is the duty which the same paragraph of the Act lays upon the railroad employes and managements, that the railroads must be efficiently and economically operated, and that is your job. I do not know which is the bigger job. I rather think yours is, but I do believe this: That whichever one is the bigger, they are so interrelated that neither one of us can make very much of a success of our job without the cooperation and assistance of the other, and that is our job.

The railroads and the Commission, the industry and the Government, work together, each with a proper appreciation of the other's difficulties and needs. I do not think that any of us have anything to worry about except to find hours enough in the day to get the work done.

I hope you may continue to have a successful convention. I hope that the railroads as an industry will continue to go forward in the future as they have in the past, because in no way can the civilization of a nation be accurately gaged than by its transportation facilities.

I wish to say again that to make a success of the opera-

tion of the railroads under the government regulation, and whatever we may think of it, it is here to stay, and whatever we may say about it, it is necessary not only to protect the railroads from, I was going to say the public, but they do not need that because that is where they get their support, but to protect them sometimes from themselves, and we have found necessary under the clause in the law which provides that the Commission may fix minimum as well as maximum rates, and it has been my duty within the past few months to write a very far reaching decision with respect to the use of minimum rates, therefore, if we are to succeed the government needs the railroads, the railroads must have the government, and as long as we go together, each appreciating to the full the difficulties and the needs of the other, we are sure of progress and successful operation of our railroads.

Report of Committee on Tank Cars

A. G. Trumbull
Chairman

The report of this committee, including three sub-committee reports on dome covers and safety valves, bottom discharge outlets, and patching Class 1, 2 and 3 cars, evidences a great amount of careful work during the past year. While no requests were received by the committee for specifications of cars to hold liquids not transportable in one of the classes of cars now available, approval was given to a number of designs covered by existing specifications. The subject of repairs to tanks in order that the character of materials and strength of design be maintained is covered in this report which proposes definite recommendations for inclusion in the specifications, pending an agreement with the American Petroleum Institute as to the kind of repairs permissible when tank cars are damaged by handling line's responsibility. One of the interesting car designs considered by the committee during the year was that of a multiple unit car with 15 one-ton containers, the details of which are yet to be worked out. An important action of the committee was the decision, in connection with the approval of balsam wool as an insulating material, to have certified test reports of the properties of materials of this kind submitted by an agency satisfactory to the committee rather than have these tests made under the direct supervision of the committee itself. This will not only save the committee time and the Association expense, but will obviate the necessity of the committee testing a proprietary article. The committee goes on record as favoring loading and unloading devices which make it unnecessary to open dome covers, and the general adoption of these devices may eventually displace the present more or less troublesome bottom outlets.

There has been no demand during the past year for tank cars required for the transportation of liquids not permissible in one of the several classes of cars now covered by the specifications, so that except for the special investigations in progress, the work of the committee has largely been of a routine character.

General

Certain designs covered by existing specifications have been approved. The investigations of safety valves, dome covers and bottom outlet valve connections have been pursued in accordance with the practice of preceding years. A discussion of each of these subjects follows in detail under the appropriate headings.

On April 10, the Interstate Commerce Commission appointed a hearing at Washington for the purpose of considering certain changes in the regulations for the transportation of explosives and other dangerous articles by freight. The docket for this meeting included complete specifications for the tanks of tank cars, Director Bartel, of the commission, explaining that in accordance with the provisions of the Explosives Act it had been decided that, in compliance with the legal requirements of the act, the publication of the specifications in the regulations was necessary.

The specifications as drafted complied in all essential particulars with those of the Tank Car Committee now in effect and it is the understanding that it is not the purpose of the commission to depart from the existing practice with respect to the formulation of the specifications or the method of investigation heretofore conducted under the direction of the Tank Car Committee.

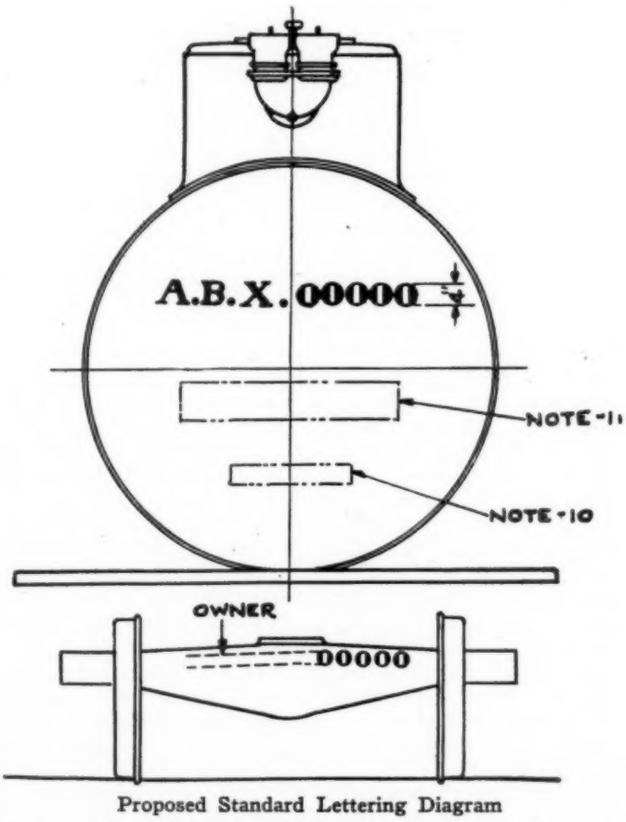
The formal hearing in this matter was postponed on request of representatives of the various interests concerned in order to permit a careful review of the specifications and consideration of the legal and practical aspects of the contemplated action of the commission.

Your committee is favorable to the proposition and will lend its active support to the Bureau of Service of the commission, as well as the Bureau of Explosives in the completion of the details necessary to the proposed changes in the regulations.

Repairs to Tanks

The report of the sub-committee appointed to recommend a fundamental standard maintenance practice for tank car repairs appears as Appendix "C."

The report properly raises a question as to the interpretation of Interchange Rule 16; moreover, pending an agreement with the American Petroleum Institute as to the character of repairs which may be made to damaged tanks where the damage is caused by handling line's responsibility, it appears desirable that there should be some standard practice to govern such repairs as may be made through agreement between the owner and the carrier. In order that the original character of materials and strength in design shall be maintained, your committee proposes that the recommendations of the sub-committee be tentatively incorporated in the specifications.



Proposed Standard Lettering Diagram

Multiple Unit Cars

Acting on instructions of the General Committee, the Tank Car Committee and the Car Construction Committee have assumed jurisdiction over the design and construction of multiple unit tank cars. These cars are of special construction and are designed for the transportation of a number of small tanks which are secured to the sub-structure of the car by such means as will permit their ready removal.

Only one design for such a car has been submitted, this providing for 15 one-ton containers meeting Interstate Commerce Commission Specification 27. The containers are to be mounted side by side in specially designed cradles secured to the underframe of the car. The details of construction of this car are still under consideration.

Tank with Lock-Bar Joints

The committee has approved for experimental use a tank having lock-bar joints, confining its use to the transportation of non-volatile liquids and volatile liquids having a flash point above 80 deg. F. This construction has been in use for a considerable period in the manufacture of steel pipe.

The lock-bar feature is applied only to the longitudinal joints and requires that the edges of the plates shall be planed to the proper dimensions and the edges then upset to a sufficient degree to form the necessary shoulder for engaging the lock-bar. The edges are then crimped in a machine to the proper radius so as to eliminate damage to the opposite edges in the subsequent rolling process. After rolling, the lock-bars are applied and the sections then drawn up by means of heavy steel clamps. The assembled tank is then passed into a pressing machine where the lock-bars are pressed down over the upset edges of the plates by hydraulic pressure.

One tank of this construction has been completed and was subjected to the prescribed hydraulic test on March 26, 1926. The tank was held under 60 lb. pressure for 25 min. and developed no leaks, after which the pressure was raised to 77 lb. for 10 min. and a hammer test made at the lock-bar seam as well as some of the welded seams without developing any leaks. This is the first tank of its class to be constructed and the service rendered will be observed by the committee as well as the builders and users of tank cars with more than ordinary interest.

Hot Oil Heater

A design was submitted covering a new type of hot oil heater to be used in insulated cars designed for the unloading of asphalt products. The heater consisted of a series of 18 coils of 3-in. pipe, extending the length of the car on the inside. All but two of the joints were welded, these two being of the Van Stone type, located at the end of the coils at the buttom.

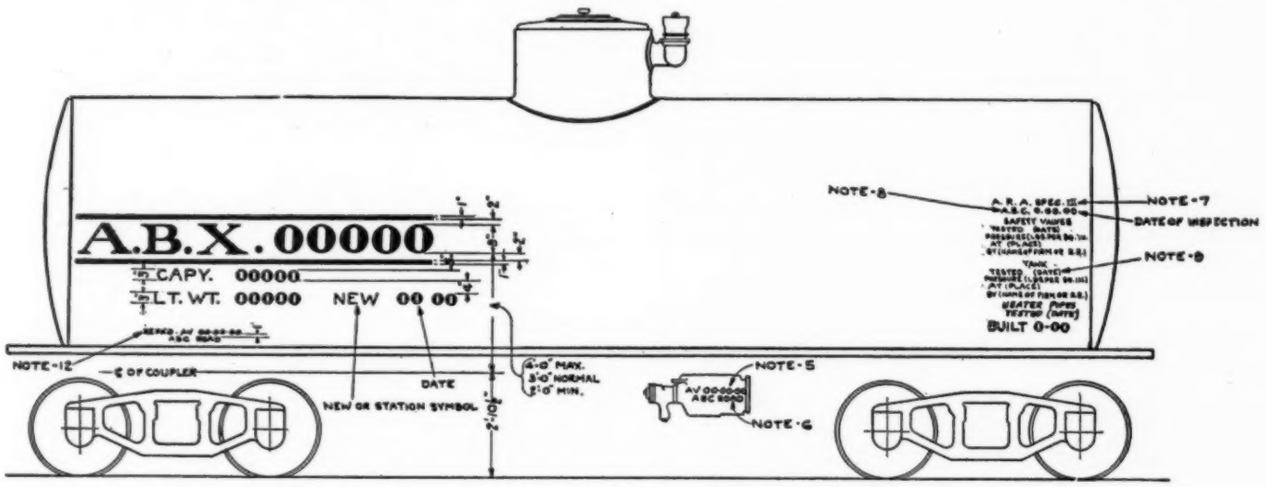
These coils were installed in the present Class IV and IV-A cars which in all other respects conforms with the specifications for these cars now in effect.

Specifications

Amendments and modifications in the specifications for tank cars are recommended as follows:

Service

Page 6, Specifications for Tank Cars: Commodities which may be shipped in the various classes of cars are incorporated in the specifications under the heading of "Service," and now permit the transportation in Class I, II and III cars of many inflammable and dangerous products. The Class I cars include all of those built prior to 1903, many of which are still mounted on wooden underframe cars secured by head blocks, or built of light plates with single riveted seams and since they are more than 23 years of age, it is obvious that they cannot satisfy current standards of design or construction necessary to modern transportation service. It is proposed therefore that effective on January 1, 1928, no products of an inflammable or corrosive nature be permitted to be shipped in Class I cars. It will be observed that the last of these cars will then have reached an age of 25 years which corresponds to a reasonable expected average life for cars of this class.



NOTES IN CONNECTION WITH PROPOSED LETTERING DIAGRAM

Note 1. Sizes and spacing of letters and figures: 7" letters and figures may be used for reporting marks. Repacking and cylinder marking 1". Safety valve test and tank test marking not less than 1". All lettering and spacing 2" unless otherwise marked.

Note 2. The reporting marks assigned by the Association of Transportation and Car Accounting Officers should be placed between the horizontal bars. If desired the name or initials of owner may be placed above the bars.

Note 3. Arrangement of reporting marks, capacity, light weight and date should be maintained as shown except that the entire arrangement may be moved slightly if necessary to suit construction of car.

Note 4. Car number and initials to be stamped or painted on intermediate or center sills at option of owner.

Note 5. When triple valve and cylinders are cleaned and oiled the initials of road doing work to be stenciled in location shown.

Note 6. Initials of Shop or Station at which work is done to be stenciled in location shown.

Note 7. Marking for Class III tank with welded seam: "A. R. A. Spec. III, experimental—welded seam. A. B. C. 0.00.00 (date of inspection).

Note 8. Initials of car builder or owner who made inspections to be applied instead of A. B. C. and class of tank car such as I, II, III, IV, V or VI to be shown after specification.

Note 9. For wooden or glass lined tanks or tanks specially designed for transportation of solids, the words, "wooden lined tank—pressure test not required" or "Glass lined tank—pressure test not required" or "for solids only—pressure test not required," as the case may be, should be stenciled on the tank in place of the record of test of tank in location shown.

Note 10. For classes II and III tank cars: Tanks used exclusively in asphalt service shall be stenciled "Asphalt only."

Note 11. Gallonage of tank and steel wheels to be stenciled in location shown at option of owner.

Note 12. On steel underframe cars repacking stencil to be applied to underframe. Cars without steel underframe to have stenciling applied on tank.

Material

Add a new paragraph (d): Class III, IV, V and VI cars. Steel, malleable iron and gray iron castings shall comply with the American Railway Association Specifications for these materials.

Tank Heads

Specifications for Class I and II cars, Section 5; paragraph one now reads:

"If tank heads less than 7/16 in. thick bear evidence of distress due to damage from contact with head blocks, they shall be reinforced at bottom by steel shoes not less than 3/8 in. thick, riveted to head and shell."

It is proposed that the words "less than 7/16 in. thick" be omitted.

This modification will require that any tank originally equipped with head blocks having heads bearing evidence of distress shall be reinforced at the bottom by steel shoes regardless of the original thickness of the head. This recommendation will be submitted to letter ballot only if the substitution for the entire paragraph hereinafter proposed fails of adoption.

Substitute for the first paragraph the following:

"If tank heads are dented or depressed 1½ in. or more due to damage from contact with head blocks, they should be straightened and reinforced at bottom by steel shoes not less than 3/8 in. thick riveted to head and shell. Shoes should be at least 18 in. high in vertical plane and be double-riveted throughout. Riveting should follow specifications, Item 3, Riveting for Class III tank cars. Shoes should extend to the side sheets and the original holes in the tank sheets utilized for the circumferential seams of the shoe.

"If the depression is less than 1½ in. and it is not evident that a shoe is required, the head should be straightened and the steel then carefully examined on both surfaces to determine whether any cracks have developed, and the tank tested after all work is done. If no cracks appear and the heads satisfactorily stand the test, no shoe is required; otherwise a shoe should be applied as above provided."

Bottom Outlet Valve

Section 7, paragraph (d) for Classes I, II, III and IV cars, alternatives one and two. *Add the words "with plug" after the word "valve."*

This modification conforms to the present requirement of the committee that valves applied to the bottom of the outlet pipe shall be provided with a plug in order to prevent the escape of liquids in case of valve leakage. This requirement now corresponds to the provisions of the specifications with respect to all cars having bottom outlets.

Section 7, paragraph (d) for Class I, II, III and IV cars: The last paragraph now reads:

"No nipples, valves, or other attachments of the bottom outlet shall project below the bottom outlet cap * * *."

It is proposed to substitute the following:

"No nipples of, valves of, or other attachments of the bottom outlet shall project below the bottom outlet cap or the combination outlet cap and valve with plug, except while car is being unloaded, except for cars used exclusively in the transportation of asphalt or soap products and so stenciled a valve may be attached to the outlet if it is properly capped and the car stenciled "Valve attached to outlet."

The purpose of this substitution is to make clear the fact that the limitation is applicable only to the outlet.

Section 7, paragraph (d) for Class I, II, III and IV cars: "Note" following the second alternative: *Change the specified limit to 12 in. which will permit the extreme projection of the bottom outlet equipment to extend within 12 in. above top of rail.*

It having appeared that the outlet connections of certain cars having fish-belly sills could not be applied so as to meet the 16 in. limit specified in this note, it is proposed to reduce this limit, making it standard for the outlet connections of all tank cars.

Section 7, paragraph (b) Classes I, II, III and IV cars. *Add after the word "must" in the second line "be of cast iron and."*

It is proposed to add these words in order to define the material of which the outlet casting shall be made as this is not now covered in the specifications.

Lagging

Section 7-A, Class IV cars. Request was received for approval of the use of balsam wool as an insulating material for tank cars. After a careful investigation as to the thermal conductivity, weight, strength and fire and puncture resistance, the committee has approved this material as the equivalent of the lagging specified for Class IV cars only. Approval for use on Class V cars was withheld for the present because of the greater rigidity and weight of compressed cork board which affords better protection against damage to the tanks in collisions and derailments than do the lighter and more easily injured products.

In connection with the subject of lagging, the committee proposes that in the future, vendors of lagging materials offered for application to tank cars shall submit with samples of such materials, a copy of a test report covering the insulating properties as compared with 85 per cent. carbonate of magnesia or compressed cork board, also the relative absorption, inflammability and compression characteristics, this information to be certified by an agency approved by the Tank Car Committee as qualified to conduct the required investigation.

The purpose of this requirement is to relieve the Tank Car Committee of the necessity for conducting such investigations on its own account and at the expense of the American Railway Association. The procedure will have the further advantage of relieving the committee of any responsibility for the results of tests of proprietary articles having a commercial value.

Anchorage

Section 13, paragraph (a), Class V cars: Sub-paragraph 2 now reads:

"Rivets securing anchorage to shell shall be hot pressed and driven on the inside, the edges of the heads to be fused by electric welding to prevent leakage, and to be covered with a metal covering fused by electric welding on all edges to keep rivet heads free from all liquids to prevent corrosion."

It is proposed to omit the words "the edges of the heads to be fused by electric welding to prevent leaking," because experience has indicated that it is a practical impossibility to weld the edges of the rivet heads without producing a loose rivet after the metals cool off. The application of the welded cap is regarded as affording ample protection against leakage of the rivet or contact of corrosive liquids with the rivet head.

Marking

Class VI cars. *Omit the words "with the additional marking 'Helium Gas.'"*

Safety Valves

Section 20: Add new paragraph (d) Class I and II cars, paragraph (c) Class III and IV and paragraph (b) Class IV-A as follows:

"In the application of safety valves to cars, care should be exercised to see that, when the valve is screwed tight into position, the drain hole points away from the dome towards tank head."

It is proposed to add new paragraph (e) Class I and II cars, paragraph (d) Class III and IV and paragraph (c) Class IV-A as follows:

Safety Valve Flange

"In the application of safety valve flanges, a threaded plug or piece of extra heavy pipe should be screwed into the flange while rivets are being applied and the rivets spotted when driven, i. e., in driving, the first four rivets shall be equally spaced on the rivet circle. The second rivet shall be driven opposite the first and the third and fourth rivets on a line at right angles with a line drawn through the first two, each succeeding pair of rivets being driven on their common diameter. After riveting is completed, the threads should be chased with a plug tap or special threaded tool to insure a perfect thread."

"The threads on the safety valve shall be sufficient in length to permit the valve to be screwed into the flange or shell at least 10 threads."

The existing safety valve design shown as Fig. 9-A is not as sensitive and not as free from leakage as is desirable and it is therefore proposed that valves applied to new cars and renewals of existing valves shall be made to conform with design developed by the American Car & Foundry Company, appearing in the report of the Sub-committee on Dome Covers and Safety Valves, permission for the general use of which has been received from the American Car & Foundry Company. The contemplated changes are inconsequential in character, but materially improve the efficiency of the valve.

Tests of Safety Valves

Class I to IV-A cars. Section 24 now reads:

"Safety valves shall be tested and, if necessary, adjusted at intervals of not over two years, those on new cars to be tested and adjusted before the cars are placed in service.

"The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure. (Fig. 13).

"When valves are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the American Railway Association standard marking for freight cars. (Fig. 6)."

It is proposed to substitute the following:

"(a) Valves applied to cars used in the transportation of inflammable liquids are required to be removed and tested on a block with air for proper spring tension using water to detect valve seat leakage.

"(b) Safety valves on all other cars shall be tested and if necessary adjusted not less frequently than once each two years.

"(c) The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure.

"(d) When valves are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the American Railway Association standard marking for freight cars (Fig. 6)."

Heater Coils

The specifications now provide for the installation of heater systems in accordance with certain general principles, the design of the internal arrangement being left largely to the individual owners. In the interest of certain users of tank cars, the committee has been requested to incorporate such requirements in the specifications as will avoid losses now resulting from inadequate or inefficient mechanical details.

The committee recognizes the desirability of a standard practice in the design and application of these coils and has therefore proposed to the American Railway Car Institute and the American Petroleum Institute that designs be developed which will conform with the requirements for as many classes of tank cars for the transportation of as many commodities as possible. It is hoped that the matter may be brought to a satisfactory conclusion and report rendered in 1927 adopting suitable standards.

Page 78. Section 4: Paragraph 2 now reads in part:

"The pipe connection preferably shall be expanded or welded, or both, into pad."

It is proposed to modify this to read:

"The pipe connection shall be expanded into pad and welded inside and outside."

Paragraph 5 now reads:

"On new installations the heater pipes shall be tight at a hydraulic pressure of 200 lb. The same test shall be applied when the tank is retested."

It is proposed to substitute the following:

"On new installations and not less frequently than each 12 months thereafter, heater pipes shall be tested with hydraulic pressure and must be tight at 200 lb. per sq. in. It is required that the tanks be stenciled in accordance with the American Railway Association standard marking for freight cars (Fig. 6)."

Fig. 6—Marking

The standard lettering diagram has been revised to correspond with the revisions in the lettering of freight cars recently adopted by letter ballot of the Association.

Safety Valves, Dome Covers and Bottom Outlet Valves

The results of the activities of the Sub-committees assigned to these subjects appear as Appendices "A" and "B."

Particular attention is invited to that portion of the report of the Committee on Dome Covers and Safety Valves, relating to approval of designs for loading and unloading devices which avoid the necessity for opening the dome cover, thereby not only preventing vapor losses, but eliminating a major hazard at unloading points, as well as in the movement of empty cars from which the dome cover is not infrequently displaced.

It is the hope of the committee that devices of this nature may find increasing use and that they may ultimately displace all types of bottom outlets which now form one of the most hazardous and troublesome features of tank car construction.

Pursuant to the plan outlined in the report to the 1925 convention, a joint-committee has been appointed for the consideration and investigation of problems relating to safety valves, dome covers and bottom outlet valves. The membership of this joint-committee is as follows:

American Petroleum Institute: Thos. Beaghen, Jr., Mexican Petroleum Corporation; A. E. Kraft, Pure Oil Company; A. E. Smith, Union Tank Car Company.

American Railway Car Institute: R. H. Davenport, American Car & Foundry Company; J. D. Andrew, Standard Tank Car Company; O. J. Parks, General American Tank Car Corporation.

American Railway Association (Tank Car Committee): A. G. Trumbull, Erie; W. C. Lindner, Pennsylvania; W. E. Cooper, Bureau of Explosives.

At a meeting of this committee, held February 17, 1926, Messrs. Davenport, Beaghen and Dunn were named as a sub-committee to negotiate with such agencies as they might elect for the purpose of ascertaining the facilities available for the proposed investigation and the approximate cost of the work for a period of one year.

After action upon the report of the sub-committee, the joint-committee will report to the general committees of the three interests concerned in the investigation with recommendations as to further procedure.

It is anticipated that at the next annual convention a report may be made of definite accomplishment in the solution of the problems relating to those details of tank car construction which now involve a major hazard in the handling and transportation of inflammable liquids.

This report was signed by A. G. Trumbull (chairman), chief mechanical engineer, Erie; J. T. St. Clair, engineer of car construction, Atchison, Topeka & Santa Fe; Geo. McCormick, general superintendent motive power, Southern Pacific; W. C. Lindner, chief car inspector, Pennsylvania System; Col B. W. Dunn, chief inspector, Bureau of Explosives; A. E. Smith, vice-president, Union Tank Car Company; T. H. Beaghen, Jr., Mexican Petroleum Company, and R. H. Owens, master car builder, Mid-Continent Petroleum Company.

Appendix A—Dome Covers and Safety Valves

Dome Covers

Since making our 1925 report and conducting service trials on the above a number of requests have been made on the sub-committee for trial of loading and unloading devices, also dome covers of various types, as follows:

1—Skelly Oil Company—A tank car loading device for high volatile products of the natural gasoline industry as developed by Emby Kaye, supt. gasoline department of the Skelly Oil Company.

2—The Holmes Universal gas-tight dome cover, as manufactured by the A. Y. McDonald Manufacturing Company.

3—Shanley loading and unloading device, manufactured by the A. Y. McDonald Manufacturing Company.

4—The Humble loading and unloading device, submitted by the Humble Oil and Refining Company, Houston, Texas.

5—Dome cover and ring by the American Car and Foundry Company, equipped with safety device.

6—Safety dome cover by the General American Tank Car Corporation.

7—American Car and Foundry Company hinge type dome cover which opens downward into the dome.

8—American Car and Foundry Company hinge type pressure locking dome cover.

9—Loading and unloading arrangement submitted by the Union Tank Car Company.

(Here followed an extended description of each of these devices together with some comments of interest regarding their application or importance.—Editor.)

During the past year the producers and blenders of gasoline from natural gases have been actively campaigning to eliminate losses incident to loading and unloading due to volatile gases escaping to the atmosphere, which can be retained with a suitable device as well as, reducing the liabilities due to fire hazards and personal injury incumbent with the handling of their products. For this reason mention is made of the unloading devices, 1 to 4 inclusive and number 9. Information on the resulting benefits of such devices now on trial is not very extensive and will be followed further during the coming year by the committee.

Safety Valves

Our 1925 report included details of a test of various safety valves and developed very little of value over the present A. R. A. standard valve, excepting that a valve with guided stem reseated better than the present valve. A number of valves were built with various combination metals for seats and guided stem and a test was conducted at Milton, Pa., July 23 and 24. Sixteen safety valves were tested, as follows:

No. 1. Standard and A. R. A. Safety Valve.

No. 6. Valve submitted by J. C. P. deKraft.

No. 12. Standard A. R. A. with rubber gasket submitted by Mr. Olsen of Skelley Oil Company.

Nos. 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16 were submitted by American Car & Foundry Co.

(Here followed descriptions of fundamental features of the 16 safety valves referred to.—Editor.)

Method of Making Tests

The air used was furnished by three compressors: two Worthington Pump and Machinery Company compressers, feather

valve type, working at 225 r. p. m. and furnishing 1,400 cu. ft. per min. at 100 lb. pressure each, and one Bury Compressor Company type C. C. 4 B, working at 175 r. p. m. and furnishing 715 cu. ft. per min. at 100 lb. All safety valves were tested on the standard flanged ring riveted to the dome cover. Each valve was given a leakage test by filling the top with water, submerging the valve seats. The air pressure was then admitted to the tank slowly and a notation made of the pressure at which the first leak appeared; also the pressure at which it boiled, opened, popped and closed, and top of valve was again filled with water on closing and notation taken of when last leak was visible and when valve was tight. The flow of air was also taken to determine the maximum outage through each valve. The 7-in. valve in supply line from the six 80,000-gal. tanks, used as a reservoir and maintained at 65 lb. pressure, was opened wide and left open for a period of 20 to 25 sec. to insure a constant flow of air and get an accurate reading of the deflection of mercury in "U" tube of flow meter.

The statement in Table I is a detailed result of tests.

In Table I, columns showing "last leak" and "valve tight" where zero is shown, the valve was not tight at any time, leaks being visible until all pressure was vented from the tank.

For test No. 1 all valves were tightened in the dome flange with jaw wrench inserted on flange of the cage except valve No. 6 which on account of its construction was tightened with a Stilson pipe wrench; it was the opinion of some of those present that the jaw wrench distorted the cage sufficiently to cause the valves to leak. For test No. 2 pipe chain tongs were used around the reinforced section of the valve cages.

All valves were reground after the first test except valves Nos. 6, 12, 15 and 16; Nos. 12, 15 and 16 having separable gaskets.

Valve No. 1 started to leak as soon as the first indication of pressure in the tank was shown on the gage and continued to leak badly until it opened at 25 lb. On the second test it was tightened in the flange by hand and then with chain tongs, ¼ in. turn at a time and leakage test made each time; it leaked slightly or bubbled at from 3 to 9 lb. and boiled at 9 lb. The valve seats on the clapper and valve cage were examined after test and were clean and smooth.

Valve No. 2 had slight leak as soon as pressure was admitted to tank and boiled at 7.5 lb. On the second test first leak or bubble was visible at 21 lb. and it was leaking badly at 23 lb.; opened at 23.5 lb. When examined after first test the valve seat on the cage had slight flaw; it was reground and examined after second test and had very slight tool marks on both seats.

Valve No. 3 had slight leak at 7 lb. which increased materially and at 17.5 was boiling. On retesting, the submerge test was repeated several times and the performance of the valve was very consistent. The first indication of any leaks appearing at from 13.5 to 22.5 lb. and were very slight until valve opened at 24.5 lb. and on closing the leaks at 20.5 lb. were slight and at 16 lb. 20 bubbles; at 14 lb. 5 bubbles per min. closing tight at 12 lb. Both valve seats were clean and smooth on examination after test. . . .

That valve No. 3 with guide stem, gave the best and most consistent performance of any of the valves tested, was the consensus of opinion of the members of the committee and those present, and it is the conclusion of the committee that the American Car & Foundry Company proceed with the manufacture of 36* valves as indicated by the committee at the test at Marcus Hook in November, 1924; this valve being analogous with the valve approved by the committee at that time. The valves are to be made up in accordance with drawings No. 2574311 and 2572830-A with monel metal bushings in the spider and monel metal stems. They are to be given a service trial during which frequent observations are to be made of their performance and at the expiration of a 4 months period are to be removed from the cars, boxed up, and without any repairs or attention whatever, shipped to the Union Tank Car Company's plant at Whiting, Indiana, where they will be given an examination and test to determine their condition, at the conclusion of which a report will be made to the Interstate Commerce Commission.

* Instead of 36 valves, 44 valves have been manufacture and applied to tank cars owned by eight companies. They will be removed and retested after 12 months service.

It was demonstrated at the test that riveting the flanges to the top of the dome, distorted the threads to the extent that the valve cages were distorted, when screwed in tight, which affected the valve seat to the detriment of the performance of the valve. The committee therefore recommends that in the application of safety valve flanges, a threaded plug or piece of extra heavy pipe should be screwed into the flange while rivets are being applied and the rivets spotted when driven, i.e., in driving, the first four rivets shall be equally spaced on the rivet circle. The second rivet shall be driven opposite the first and the third and fourth rivets on a line at right angles with a line drawn through the first two, each succeeding pair of rivets being driven on their common diameter. After riveting is completed, the threads should be chased with a plug tap or special threaded tool to insure a perfect thread.

The committee is very much indebted to the American Car and Foundry Co. for the use of its plant and facilities and the interest manifested by it in developing the valves submitted for test,

Valve No.	Test No.	POUNDS PRESSURE ON TANK AT: First Leak	Boiling	Opened	Popped	Maximum	Closed	Last Leak	Remarks	Tight	Outage Cu. Ft. Per Min.
1	1	0	0	25	25	40	23	0		0	15572
1	2	1 & 3	18	23	25	25	.....	0		0	.....
1	3	2	See note on valve No. 1								
2	1	0	7.5	26	29	40	23	0		0	15059
2	2	21	23	23.5	24.5	.....	23	18		15	.....
3	1	7	17.5	26	27.5	40	22.5	0		0	14506
3	2	23	See note on valve No. 3							12	.....
3	3	22	24	24.5	27	.....	24.5	20.5	20 bubbles per min. at 16#–5 at 14.75	12	.....
3	4	14.5	22	24	27	.....	24.5	.....		.....	.....
3	5	13.5	21	24	27	.....	24.5	.....		.....	.....
3	6	22.5	23.5	24	27	.....	24	.....		.....	.....
3	7	18.5	22	24	27	.....	24	.....		.....	.....
4	1	0	5	24.5	25	40	6	0		0	10096
4	2	9	19	23	24	.....	21.5	16	6 bubbles per. min.	2	.....
5	1	0	7	24	26	45	20	0		0	14345
5	2	20	22.5	24	25.5	.....	22.5	13		2.5	.....
6	1	7	12	22	26	50	22	0		0	9620
6	2	11	21	22	25	.....	21.75	3	10 bbls. per. min. at 2.25#–10 at 2#	2	.....
7	1	0	16	26	28	40	22	0		0	.....
7	2	4	22	25.5	.....	.....	22.5	18		3.25	.....
8	1	0	9	25	26	40	21	0		0	15572
8	2	Valve screwed in dome flange to determine if leak occurred in same location.								Screwed in by hand	
8	3	10	23.5	.....	27	.....	24.25	17	5 bbls. per. min. at 10#	10	.....
9	1	2	15	25	26.5	40	25	0		0	14034
9	2	22	23.5	24	27	.....	24.25	21.5		18.75	.....
9	3	23.5	23.5	24	27	.....	24.25	21.5		18.75	.....
9	4	23.5	23.5	25	27	.....	24	22.25		20	.....
9	5	23.5	23.75	25	26.75	.....	24.5	22.25		20	.....
9	6	22	23.5	.....	26.75	.....	24.5	22.5		20	.....
10	1	6	13	24	25	40	22.5	0		0	16039
10	2	19.5	23	24.5	25.5	.....	23.5	12.5	5 bubbles per. min. at 12.5	8.5	.....
11	1	0	11	25	27.5	40	23.5	0		0	15572
11	2	22.5	23.5	24.5	25.5	.....	23	15	12 bbls. per. min. at 12#–6 at 11#–4 at 10#	9	.....
12	1	20	22	22.5	23	37.5	17	0	Gasket blew out at popping. See note	0	16859
13	1	8	15	25	27	40	22.5	0		0	15887
13	2	15	18	23	23	.....	23	15		0	.....
14	1	13	19	25.5	26.5	40	23	0		0	15781
14	2	19.5	23.5	24.5	26.5	.....	23	22	20 bbls. per. min. at 21.5#–12 at 18#–6 at 16.25	15.25	.....
15	1	21	23	25	27.5	35	Valve clapper caught on cage			Lead gasket	17344
15	2	0	5	23	25	.....	23	0	Armstrong Pressed cork gasket	0	.....
16	1	22	.....	25.5	27.5	40	23	0	Lead gasket	0	16505
16	2	18	20	23	24.5	.....	22	8	Lead gasket	3	.....
16	3	22	23.5	23.5	24	.....	21.5	.....	Armstrong Pressed cork gasket	13	.....
16	4	17	22	22.5	24	.....	21.5	.....	Armstrong Pressed cork gasket	13	.....

Table I—Detail Statement of Results of Tank Car Safety Valve Tests

and also wishes to thank the various persons and concerns who submitted valves, for their co-operation and assistance in this work.

This report was signed by the joint sub-committee on Dome Covers and Safety Valves.

Appendix B—Bottom Discharge Outlets

Your sub-committee on Bottom Discharge Outlets has not found it necessary to make any changes in the specifications recommended in its report dated May 22, 1925, which specification has since been approved by the American Railway Association and became effective March 1, 1926.

Since May 22, 1925, we have considered 12 new designs of bottom discharge outlets, 3 of which have been approved for service trial, making a total of 33 designs approved for service trial prior to April 1, 1926. Of this total 20 have not proved satisfactory and have been withdrawn from service trial, leaving in service 13 designs, 9 of which appear to possess all of the essential features prescribed in the specification proposed by the sub-committee in its 1925 report and made effective March 1, 1926, after which date all new tank cars requiring bottom discharge outlet valves must be equipped with a design of valve approved by the Tank Car Committee and proved by service trial to comply with the specification.

(The sub-committee included with its report a summary of nine new designs of bottom discharge outlets which appear to comply with the specifications effective March 1, 1926, as follows: "Positive Self-Locking," American Car & Foundry Co., New York; "Bolton & Minnear," National Refining Company, Coffeyville, Kan.; "Donomarent," Gulf States Terminal & Transport Co., New Orleans, La.; "Young," Indian Refining Company, Lawrenceville, Ill.; "Merco-Nordstrom," Merco-Nordstrom Valve Company, New York; "Panhandle," Panhandle Refining Company, Wichita Falls, Tex.; "Perfection," Perfection Valve & Supply Co., Kansas City, Mo.; valve by Union Tank Car Company, New York; and "Waugh," Wilson Car Lines, Chicago.—Editor.)

The solution of the bottom discharge outlet valve problem as far as replacements and new tank cars are concerned appears to have been attained to the extent that valves built in compliance with Section 7 of the A. R. A. Specifications for Tank Cars, as now in effect, provide security against leakage caused by unseating of the valve by external violence of freezing of liquid in the bottom outlet casting. However, your sub-committee is not at the present time in a position to recommend a date after which the bottom discharge outlets of all tank cars must comply with the new specifications.

Another hazard associated with the use of the bottom discharge outlet valve, i.e., the necessity for removing the dome cover to operate the valve, may eventually be eliminated by the adoption of a specification for loading and unloading devices which provide for operating the bottom discharge outlet valve without removal of the dome cover, several of which devices have recently been approved for service trial by the Tank Car Committee.

This report was signed by the sub-committee on Bottom Discharge Outlets, W. E. Cooper, Chairman; J. T. St. Clair (A., T. & S. F.); A. E. Smith (Union Tank Car Company), and Thos. Beaghen, Jr., Mexican Petroleum Corporation.

Appendix C—Patching of Tank Cars

Application of Shoe to Head, Class I and II Cars

Investigation into the above subject has developed considerable difference of opinion among those directly interested as to what constitutes signs of distress in the tank head under Paragraph 5 of Specifications for Class I and II tank cars.

It is recognized that many owners are reluctant to make proper repairs and for that reason your committee has endeavored to formulate a rule that is not drastic, yet, at the same time, compels proper consideration to be given to the condition of the tank head when head blocks are removed.

The proposed Rule would read as follows:

"Specifications for Class I and II Tank Cars.

"5. Tank Heads.—If tank heads are dented or depressed 1½ in. or more, due to damage from contact with head blocks, they should be straightened and reinforced at bottom by steel shoes not less than ⅜ in. thick riveted to head and shell. Shoes should be at least 18 in. high in vertical plane and be double-riveted throughout. Riveting should follow specifications, Item 3 Riveting for Class III Tank Cars. Shoes should extend to the side sheets and the original holes in the tank sheets utilized for the circumferential seams of the shoe.

"If the depression is less than 1½ in. and it is not evident that a shoe is required, the head should be straightened and the steel then carefully examined on both surfaces to determined whether any cracks have developed, and the tank tested after all work is done. If no cracks appear and the heads satisfactorily stand the test, no shoe is required; otherwise a shoe should be applied as above provided."

Patching Tanks of Class I, II and III Cars

Rule 16, A. R. A. Code of Interchange Rules, has been quoted as authority for the contention that the patching of tank cars is not permissible inasmuch as Rule 16 in part reads:

> "Repairs to foreign cars shall be properly made, and the work shall conform in detail to the original construction, and with the quality of material originally used, except as provided for in Rules 17, 18, 87, 114 and 120."

This would exclude the application of patches to head or shell of tank when the metal is fractured or damaged so as to make it unserviceable and requires the replacement of the damaged sheet with one of strength equal to the original design.

It is held that the application of patches to tanks decreases the value of the car and increases the number of rivets, thereby producing the possibility of leakage.

This contention on the part of tank car owners has caused more or less controversy between them and roads making repairs to foreign tanks, especially where such equipment has been damaged as a result of wrecks, derailments, etc. It has developed on joint inspection that the tanks could be repaired for considerably less money than the replacement of damaged sheets would involve and, in the opinion of the mechanical department of the roads, made fit to safely carry any kind of a commodity for which the tank was designed.

The owners of the cars have also objected to the application of a shoe to the head of tanks of Class I and II cars where ends have been damaged in contact with head blocks. There is, naturally, considerable difference in cost involved in the two viewpoints taken and your committee feels that the question mentioned, as to whether patching of tank cars is prohibited under A. R. A. interchange rules, should first be settled. If it is decided that patching is permissible, then your committee will recommend that patches should be applied as follows:

1.—Should be of thickness equal to adjacent metal and not less than ⅜ in.

2.—Defective sector should be burned out if sheet is badly buckled or crushed and all seams of patch double-riveted, following specifications for riveting as given in Item 3 of Specifications for Class III tank cars. On Class I and II tanks, where adjacent connection is single-riveted, single-riveting may be used for corresponding connections.

3.—Patches should be of such a size as to prevent rivet heads coming in contact with any obstructions in the underframe. All patches on underside of tank shall extend six inches above any underframe obstruction if side seams do not prevent, otherwise they should be connected to side seams.

4.—In the application of shoes, if the tank head is cracked the defective portion of the head shall be cut out before patch is applied and both overlapping edges caulked.

Your committee has recognized that it is a difficult matter to lay down a suitable rule covering repairs to be made and that it is hard to decide where to draw the line to show when material is damaged sufficiently to require patching or whether it should be renewed.

When patches are applied, it is, of course, desired to secure strength equal to the balance of the construction, but there is considerable difference of opinion as to what should be considered "equal strength." The quality in this case would necessarily have to be constructed as successfully passing the test, that the tanks would naturally be subjected to after all work on them has been completed. If the repairs made stand this test, it is only fair to assume that equal strength has been obtained.

This report was signed by the sub-committee on Patching Tanks of Class I, II and III Tank Cars. J. T. St. Clair (A. T. & S. F.), chairman; G. McCormick (S. P.); A. E. Smith (Union Tank Car Company); T. H. Beaghen (Mexican Petroleum Corporation), and R. H. Owens (Mid-Continent Petroleum Corporation).

Discussion

When reading the report the Chairman made the following remarks about the matter under the subhead Repairs to the Tank: "This is a vexatious problem. But it is obvious that as long as the construction of the tank is covered by specifications there should be some limitation

imposed upon the character of the tank to be made which will result in conforming those repairs to the detailed requirements of the specification, particularly as to strength and design of the seams and other details that will occur to you."

Under the heading of Tank Heads, the Chairman made the following remarks: "In the specification for Class I and II cars, there is included a requirement in respect to repairs to the heads of tanks which bear evidence of distress, which is indefinite and has been the cause of considerable difficulty to the members of the association, and has resulted in raising a great many questions as to what is meant by "distress," and such circumstances under which it is necessary that the repairs be made. Not infrequently some owners of tank cars have repaired one end of a tank which bore evidence of distress without making similar repairs to the opposite end, and the railroad with which I have been connected has had several instances where that unreinforced end has given way. So that it is now proposed to amend the specifications in such particular as will indicate at least to some extent the circumstances under which the head may be regarded as distress.

The committee foreseeing possibly that one of its recommendations might not be carried, therefore has two proposals to make, one to be voted on in case the other is not adopted on letter ballot. You will note the present provision is that the reinforcement shall be applied if tank heads are less than 7/16 in. thick and bear evidence of distress. It is rather surprising to say that the committee was asked to interpret this rule and to state whether, regardless of the fact that the head might bear evidence of distress, it was necessary to say whether the head was more or less than 7/16 in. Therefore, the first proposal is that the words "less than 7/16 in." be omitted. That would make application of the shoe necessary to any head, if it bore evidence of distress, regardless of its thickness.

Since the printing of the report the question was raised which seems to make it advisable that there be added this paragraph:

"These requirements are not applicable to tank heads already reinforced."

By a vote of the committee yesterday, it was decided to omit the paragraph pertaining to the safety valve design as shown in Fig. 9-A in the report. The effect of that would be to postpone the adoption of the modified design here described and which modification merely provides for a better guide to the valve stem. The present opinion of the committee will result in a valve which will function much more accurately than the one now covered by the manual.

Under the head of Tests of Safety Valves, Class I to IV-A cars, the committee proposes to modify Section 24 to read as follows:

"(a) Valves applied to cars used in the transportation of inflammable liquids are required to be removed and tested not less frequently than two years for Class I, II and III cars and not less frequently than one year for Class IV and IV-A tank cars."

That differs from the existing specification in respect for the interval of the tests of the valves on the Class IV and IV-A cars, which are those used in the transportation of casing head gasoline and blends thereof, and which, in the opinion of the committee and those who are familiar with the transportation of casing head gasoline is an interval, as proposed, not too frequent. In fact it is the practice of most of the companies interested in the transportation of these products to test the valves even more frequently than is here proposed to be required.

"The tests are required to be made on a block with air for proper spring tension, using water to detect valve seat leakage."

That is a new requirement. The committee considers that if the proper functioning of the valves is to be determined, it cannot be done properly except by a block test. And the provision will also afford, we think, some relief to the tank car owners who, although quite justly, complain of the bills which they receive from the railroads for tests made to safety valves for the present form of device, which is not wholly adequate for the purpose, particularly for valves which are applied to cars used in the transportation of inflammables.

"(b) Safety valves on all other cars shall be tested and if necessary adjusted at intervals of not over five years those on new cars to be tested and adjusted before cars are placed in service.

"These tests may be made without the removal of valves from the car provided the valves unseat at a total pressure corresponding with the area of the seat multiplied by the required pressure."

That permits the present method of test by the portable device illustrated in the specification on all cars which are not used in the transportation of inflammable liquids.

"(c) When valves are tested on any car, the date, pressure to which tested, place where test was made and by whom, shall be stenciled on the tank in accordance with the American Railway Association Standard Marking for Freight Cars."

In the last paragraph of Section 10, under the heading Heater Coils, or requirements for tests, it has been modified by action of the committee yesterday, in the following particulars. As contained in the text report, the requirements are that on new installations and not less frequently than each 12 months thereafter heater pipes shall be tested with hydraulic pressure and must be tight at 200 lbs. pressure. It is proposed to change that to read that on new installations and after repairs to heater pipes or when tanks are tested, the heater pipes shall be tested with hydraulic pressure and must be tight at 200 lbs. pressure. The committee considered that a requirement that heater pipes should be tested not less frequently than each 12 months was unnecessary and really imposed upon the owners of tank cars a burden from which they should be relieved. It is desirable, of course, that the leakage in heater pipes should be eliminated, but it is not really a vital point because if there should be a leak in the heater coils, if the coils are at all in accordance with the specification, there could be no leakage outside of the tank, and your committee has no information, nor is any information available as far as we know, indicating that there has ever been any difficulty from heater coils which would necessitate a more rigid requirement in regard to the test than is now contemplated by the proposed revision.

Under the heading of Marking, the proposed marking for tank cars follows the recommendations of the Car Construction Committee with respect to other classes of equipment. As printed, the proposals do not correspond fully with the revised practice recommended by the Car Construction Committee, but before submission to letter ballot, the details that may not be in conformity with the Car Construction Committee's reports, under a circular which I believe has been approved by letter ballot of the Association, will be modified. This is merely a question of bringing the tank car marking in conformity with all other classes of freight equipment.

At the meeting Thursday, the Chairman was directed to incorporate under the heading of Safety Valves, Dome Covers and Bottom Outlet Valves the following: "That contingent upon appropriate action by the convention the Committee will submit for approval by letter ballot as approved practice, the fundamental bolted type dome cover permanently attached by means of hinge or chain."

It seems desirable that tank car construction should be covered in the specification in much more detail than is now the case. The Chairman was also directed to present the following additional modifications in the specification, which we had attention directed to yesterday by one of the tank car builders, under the heading of welding. It is proposed to modify the requirement as to the seam to read that the seams shall be riveted, metal to metal. The present requirement is that the seams should be riveted, metal to metal without the interposition of other material. It is proposed that this be modified to read "Seams and all attachments to the tank shall be riveted, metal to metal, without the interposition of other material."

The reason for that is that certain attachments such as hand rail columns are made to the tank, and certain companies have specified to the builders that tanks shall be constructed with an appropriate gasket between the hand rail column and the tank, which was designed to take up leakage in case any leakage should occur. It is a highly undesirable practice and it should be prohibited by appropriate provision in the specification.

The construction certificate now covers cars designed by the builder, and therefore the certificate is incorrect in requiring him to certify that the designs were his own. It is proposed, therefore, to modify the text of the certificate to read "That the cars built in accordance with the designs approved by the builder."

That, of course, places the responsibility for checking the design with the specifications upon the builder where, in the opinion of your committee, it properly rests.

S. O. Taylor (M. P.): That portion of the report referring to repairs to tank cars deserves careful consideration, as this matter is not properly defined in the present interchange rules or tank car specifications, and repairs to tank cars are the source of an endless number of controversies between the owners and carriers. The question invariably arises as to what constitutes proper repairs.

Railroads in general have received some very serious objections from owners to certain repairs which were considered by carriers as having been properly made and conformed to the original strength and requirements of the specifications and interchange rules. Tank car owners object to the practice of splicing metal center sill members where the work is performed in accordance with interchange rule No. 22. Complaints are also made regarding the straightening of tank sheets where they are not very badly bent, owners claiming the sheets are weakened and insist on the application of entirely new sheets. This, of course, forces the railroads to expend large sums of money unnecessarily.

There are other items which, in the interest of economy, should be given careful consideration, such as patching sheets and splicing of longitudinal sheets, especially continuous belly sheets, and it is not considered necessary to scrap such parts when slightly damaged, and it is certainly not economical. This work can be performed in a manner that will restore equipment to original strength and material requirements, and see no good reason for penalizing carriers to the extent of a complete new application of such members simply because the repairs were necessitated on account of handling line responsibility. A considerable number of the owners are making repairs of this nature to their own equipment.

They do not restrict their objections to repairs necessitated by unfair usage, but in a great many cases object to carriers making repairs occasioned by ordinary wear and tear, or, in other words, owners' defects. Some of the tank car owners making such objections do not have facilities for, and do not make the repairs that are essential to safe operation of trains.

G. E. Tiley (Gen'l. Chem. Co.): I do not know whether it is generally realized that from now on anything that is done in connection with the tank car situation is of prime importance to this association for the reason as your Chairman has stated, the Interstate Commerce Commission, on April 10, 1926, at a hearing in Washington, D. C., surprised everybody present with supplemental docket No. 33,666, which proposed without any advance notice to anybody, except several days, to incorporate tank car specifications in the Interstate Commerce Commission's Regulations, otherwise known as I. C. C. Freight Car No. 1.

It was agreed by all present that this was a radical step, and we unanimously requested postponement of the adoption of those proposed specifications until a subsequent hearing, which is likely to come anywhere between July and September of this year.

We could not get the Commission to say that the proposed docket or proposed regulations were an exact transcript of the American Railway Association's specifications. Neither was there time to make a comparison. As a result, the Commission granted the request.

The industries are making their own rules at this time, and we have found certain changes are advisable.

The problem is more far reaching than appears on the surface. In the first place, when those specifications are taken over by the Commission, it involves fines, ranging from $1,000 to $10,000, imprisonment for from one year to ten years for any known violation of any of those regulations, and as we see it, it involves the car builder, the car owner, and the carrier. Therefore, the tank car owners are in a rather peculiar situation. In the first place, they have operated cars successfully in the corrosive acid business for 30 years or more. Those cars do not comply with A. R. A. specifications in certain particulars, and neither will they comply with the proposed specifications by the Commission. The cars having been designed on the result of chemical experience in order to provide the carriers with equipment that they believe is more safe than the appliances specified by the American Railway Association.

The Commission is confronted and the owners of those cars are confronted with the question as to what is going to happen with all the existing equipment today if these specifications are adopted under certain limitations.

We are presented today with a report of the Tank Car Committee. If the Commission takes over the regulation, these recommendations such as are adopted by the Association, will finally have to be accepted by the Commission.

Mr. Trumbull: I think there is some undue apprehension about the proposed action of the Commission. It really is largely a technical matter. But I wanted to direct attention to one thing in reference to it, and that is that Mr. Tiley referred to tank cars. It is true that the advance docket issued by the Commission prior to the hearing in April referred to the subject as tank cars, but the fact of the matter is that the specifications were intended to cover only the tank. That is the present requirements with respect to transportation of dangerous articles covered by the regulations, which include specifications for containers of various characters.

In order that you may not be unduly concerned with this situation, the specification for the Class VI car, that is already covered in the A. R. A. specifications, but omits any reference to the container or tank which is covered by the regulations. Therefore, if the action of the Commission finally becomes effective you will have simply a present specification for tank cars, with a reference to the specification for the tanks, the same as is now incorporated in the A. R. A. specifications for the Class VI car.

I have the assurance that the method of procedure with reference to the specifications for tanks with respect to the tests for the various appliances and appurtenances will

be precisely the same in the future as it has been in the past.

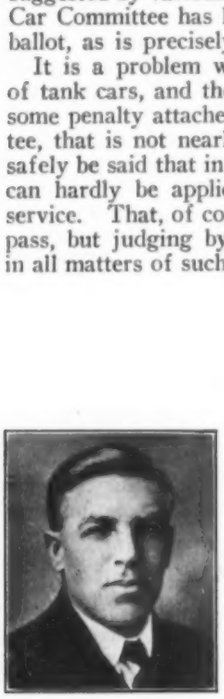
Undoubtedly, if procedure is followed as is now proposed, modifications in specifications contemplated here suggested by various interests to be passed on by the Tank Car Committee has heretofore, will be submitted to letter ballot, as is precisely now the case.

It is a problem which peculiarly concerns the owners of tank cars, and the violation of specifications will have some penalty attached to it. In the view of the Committee, that is not nearly as serious as it might be. It can safely be said that in respect to any of those penalties they can hardly be applicable to any tanks that are now in service. That, of course, is a matter upon which I cannot pass, but judging by previous action of the Commission in all matters of such importance, it has not been the practice either to make regulations retroactive or to impose any undue burden or impracticable requirement upon any interested parties.

It is impossible to state here more particularly what may be the outcome of the hearing, which I have touched upon in connection with other portions of the report. The General Committee had authorized the Chairman of the Tank Car Committee to appear at the hearing and to represent the association in all matters which might properly come before the Commission at that hearing. The Chairman will be associated with counsel of the Executives, and with counsel representing the other interests in order that all of the aspects of the situation may be thoroughly covered.

(A motion was made and carried that the report be submitted to letter ballot).

Brakes and Brake Equipment



G. H. Wood
Chairman

The committee on this important subject has looked into the possibility of accident prevention in the case of dropped brake beams due to broken hangers or hanger supports in favor of a combination bottom rod and brake beam support adjacent to each brake beam. It also recommends the development of improved designs of brake beam hangers and hanger pins. A letter ballot on retaining valves is proposed and the balance of the committee work has been largely confined to air brake hose couplings, gages and packing rings for these couplings. The importance of this work as tending to eliminate the non-standard couplings and defective packing rings responsible for so much of present train line leakage can hardly be overestimated. Aside from representing an extensive power loss in the aggregate, train line leakage, particularly in long freight trains, makes safe and smooth train handling difficult, if not impossible. The use of these gages, and rigid rejection of all couplings and packing rings which do not meet the required standards should do much to remedy this situation.

Your committee has been requested to define or to prepare specifications for "an efficient auxiliary device for supporting a brake beam in case of failure of brake hanger or hanger support" to meet the requirements of Interchange Rule No. 3-r.

In connection with this request, we have made a service inspection of a great many different designs of brake beam supports and have been furnished with prints of several designs of which there are none in service. All of these supports can be classified under one of the following general headings:

(A) **Auxiliary or Safety Straps,** for supporting the brake beam in the case of failure of a brake beam hanger or hanger attachment.

(B) **Combination Bottom Rod and Brake Beam Supports,** used primarily for supporting the bottom rod in case of a disconnected or broken bottom rod and secondarily for supporting, through the medium of this rod, the brake beam in the case of failure of a brake hanger or hanger attachment, and

(C) **Third and Fourth Point Supports,** used primarily for balancing the brake beam so that the shoes will be substantially concentric to wheel treads when the shoes are in release and application positions, and secondarily for supporting the brake beam in case of failure of a brake beam hanger or hanger attachment.

The brake beam balancing feature is not included in the rule and there is no apparent reason why it should be, since the purpose of the rule is to provide protection against damage that may result from the failure of hangers, etc. It has, therefore, been excluded from the committee's investigation. In fact, a literal interpretation of the rule would seem to restrict its application to "an auxiliary or safety strap" for supporting the brake beam only, in case of failure of a hanger or hanger attachment. It is true, however, that a disconnected bottom rod caused by the loss of a brake pin or a bottom rod failure, may easily result in as much damage as would be sustained through the failure of a hanger or hanger attachment. It is, therefore, the Committee's judgment that if a support is to be required under the rules, it should include the bottom rod.

The judgment of the Committee in this respect is apparently concurred in, or anticipated by several members who have voluntarily submitted drawings for bottom rod supports which they are using for supporting the beam as well as the rod. Drawings were also submitted by a member of the division showing a truck and brake construction, in use on a large railroad system, in which the bottom rod passes over the spring plank. The claim is made, correctly so the Committee believe, that in such a construction, the spring plank, in combination with suitable brake beam hangers and hanger attachments, supplies adequate support for brake beams and bottom rods.

The advisability of requiring, under the Rules of Interchange, the application of a support for the brake beam only, a combination support for the bottom rod and the brake beam or separate supports for the two, has been carefully considered, and the following conclusion in connection therewith would seem to be amply justified by the data at hand and the study which has been made of the same.

(a) Owing to the work which has been done by the Car Construction Committee in the development of improved hangers and hanger attachments, there is, now, less demand for Rule 3-r in its present form than there formerly was.

(b) That if a suitable "bottom rod support" is used in combination with such hangers and hanger attachments, as we understand will be recommended this year by the Car Construction Committee for new equipment, adequate protection will be afforded against damages that may result from the occasional failure of a brake beam hanger on such equipment, and

(c) If similar hangers and hanger pins such as are recommended by the Car Construction Committee are developed for, and used on existing equipment, with a properly designed bottom rod support, the combination will afford the protection contemplated, under the rule in question, for this existing equipment.

Recommendations

It is recommended that:

1.—Four wheel freight car trucks having inside hung brakes, with bottom brake rod or brake lever connection located below the spring plank, shall be equipped with a combination bottom rod and brake beam support adjacent to each brake beam, substantially as shown in the accompanying drawing. The net cross sectional area of the hanger portion of the support which is in tension shall be not less than 1½ sq. in. The support shall be so installed that when one end of the bottom rod is disconnected from the truck lever, the disconnected end of the rod will be at least 2½ in. above the rail line.

2.—That development of improved designs and specifications for brake beam hangers and hanger pins for existing cars be given special consideration during the coming year.

Retaining Valves for Freight Equipment Cars

Investigations which were instigated in 1919 by the Committee on Train Brake and Signal Equipment in connection with retaining valves disclosed the fact that there were approximately 20 different types and capacities of retainers in service on freight equipment cars. Recognizing the desirability of reducing this number to a minimum, the committee recommended in its 1919 report "for adoption as recommended practice, two pressure spring type retaining valves of such capacity as may be open for further consideration." This recommendation was adopted by letter ballot and resulted in reducing the number of retainers for freight service from approximately 20 to a maximum of 6. The committee was subsequently requested, pursuant to recommendations contained in its 1919 report, to investigate and report on the question of standard capacity for retaining valves of the two pressure spring type.

In 1920 an exhaustive series of tests were conducted on grades ranging from 1¼ to approximately 3¾ per cent with various capacities and types of retaining valves. Owing to business depressions beginning in 1921 the committee's investigations and tests were discontinued temporarily. Investigation did, however, result in advancing to standard, in 1922, by almost a unanimous vote, the two pressure spring type retaining valve which was adopted as recommended practice in 1919.

During the past year a number of additional tests have been made with 10-20 duplex spring type retaining valves having a rate of blowdown of 50 and 90 seconds respectively (against a blowdown rate of approximately 35 seconds for valves now in use), which were found to be suitable for a universal standard. The committee, therefore, recommends submitting to letter ballot, revising paragraph 1, page 13, section E, Manual of Standards and Recommended Practices, to read:

> Retaining valves for freight equipment cars. A three position 10-20 lb., duplex spring type retaining valve, with which the pressure will blow down from a 10-in. cylinder with 8-in. piston travel or a volume of 640 cu. in., from 55 lb. to 25 lb. in 85 to 95 sec. when in high pressure position, and from 45 lb. to 15 lb. in 45 to 55 sec. when in low pressure position should be used.

If the above recommendation is adopted, three position duplex spring type retaining valves now in use can be conveniently converted at a nominal cost into the proposed standard 10-20 retainer which will obviate the necessity of using more than one type of retainer.

Air Brake Hose Couplings, Gages, Packing Rings

The air brake hose coupling drawing on Page 17, Section "E" of the Manual of Standard and Recommended Practice, includes nominal dimensions only, which the committee finds to be inadequate for proper protection against leakage at the packing ring. A new drawing, Fig. 1, which includes tolerance for all dimensions affecting the interchange of couplings, fit of packing rings in the ring groove and the compression of the packing ring has,

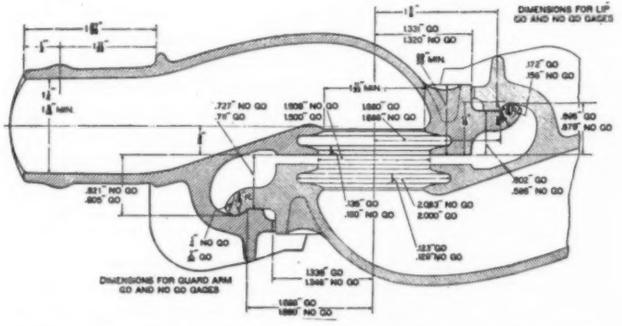


Fig. 1—Tolerances for All Coupling Dimensions Affecting Interchange

therefore, been prepared and its substitution for the coupling drawing shown on Page 17, Section "E" of the Manual is recommended.

Gages for Air Brake Hose Couplings

The air brake hose coupling gages shown on Page 3, Section "B" of the Manual, as recommended practice, are intended for gaging used couplings at hose mounting stations to detect distorted guard arms and lips, and are not suitable for accurately checking all important dimensions of new couplings.

It is seldom necessary to re-gage many of the important dimensions, which are subject to but little, if any, wear after the couplings are placed in service and to gage them each time the couplings are mounted would involve an unnecessary amount of time and labor. It is advisable, however, to frequently check the guard arm and lip for distortion; and all dimensions affecting the interchange of couplings, fit and compression of packing rings, etc., should be checked before new couplings are placed in service, which cannot be done with gages suitable only for checking guard arms and lips. Obviously, therefore, the best results, consistent with economical practice, will be had by using separate gages for new and used couplings, and it is recommended that the designation of the gages shown on Page 3, Section "B" of the Manual, be changed to read: "Air Brake Hose Coupling Gages, for Gaging Guard Arm and Lip on Used Couplings at Hose Mounting Stations."

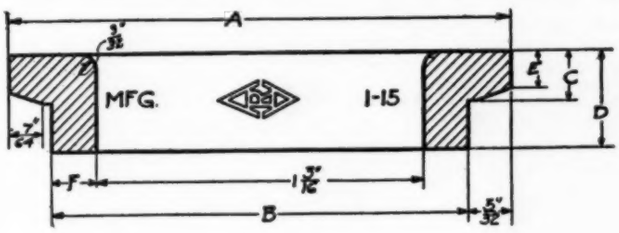
Packing Rings for Air Brake Hose Couplings

In connection with the question of packing rings for air brake hose couplings, a circular of inquiry, D. V. 423, was issued by the secretary under date of August 29, 1925, asking the members to report their practice, with respect to dimensions, in the purchase of packing rings and to give their recommendations for changes in tolerances.

Replies to this inquiry indicated that practically 90 per cent of the roads were buying packing rings in accordance with the present standard specifications and dimensions and the recommended changes in tolerances were of a minor character.

These replies were considered at a joint meeting of the Committee on Brakes and Brake Equipment and Specifications and Tests of Materials on November 19, 1925, with the conclusion that the former sub-committee should ascertain if the present packing ring tolerances are suitable for couplings conforming to the dimensions and checking gages which were to be recommended, if so, no change should be recommended in packing ring tolerances. It was also the conclusion of the two committees that the tolerances for packing rings, which are now provided for only in the packing ring gage, should be included in the specification for packing rings and the drawing for the latter.

The committee finds that packing rings conforming to present standard dimensions are suitable for use in couplings conforming to dimensions shown in Fig. 1, and recommends replacing the packing ring drawing on Page 17, Section "E" of the Manual, with a new drawing, shown herein as Fig. 2, which includes the



	A	B	E	C	D	F
Minimum *	1.796	1.484	.135	.166	.341	.140
Nominal	1.812	1.500	.140	.171	.343	.156
Maximum *	1.828	1.515	.145	.176	.354	.171

*Note:-These tolerances should be checked with a gage conforming to the gage dimensions shown on page 3-A Sec. B.

Fig. 2—Air Brake Hose Coupling Packing Packing Ring

nominal dimensions and tolerances now provided for in the packing ring and gage drawings. It also shows the A. R. A. monogram with its long axis in the horizontal position to conform with the present practice for air brake and signal hose.

A number of couplings and several sets of gages, made to drawing Figures 1 and 3, have been thoroughly tested out, under the observations of a member of the sub-committee, on one large railroad and by one important manufacturer of hose couplings, with satisfactory results. In fact, with one or two minor exceptions, no changes in nominal dimensions are contemplated. On the contrary, the proposed dimensions are, in effect, plus and minus tolerances, consistent with present nominal dimensions.

Gages for New Air Brake Hose Couplings

The following gages are for gaging new air brake hose couplings:

Fig. 3—"Go" and "No-go," for gaging the bore of the gasket opening, and the edge of this bore is again used in gaging the relative location of the gasket groove and gaging the groove itself.

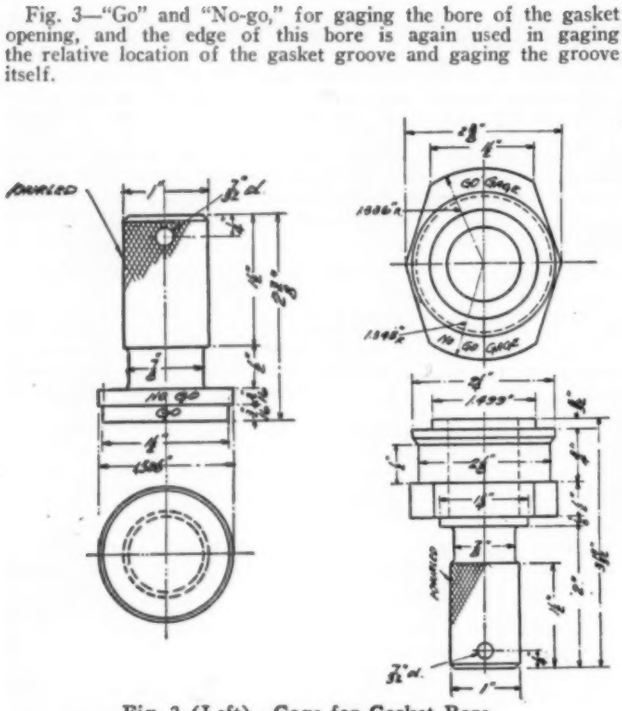


Fig. 3 (Left)—Gage for Gasket Bore
Fig. 4 (Right)—Gage for Guard Arm End

Fig. 4—"G" and "No-go," for gaging the guard arm end.

(Ten other air brake hose coupling gages were recommended by the committee which also recommended a drawing for steam heat hose clamps.—Editor.)

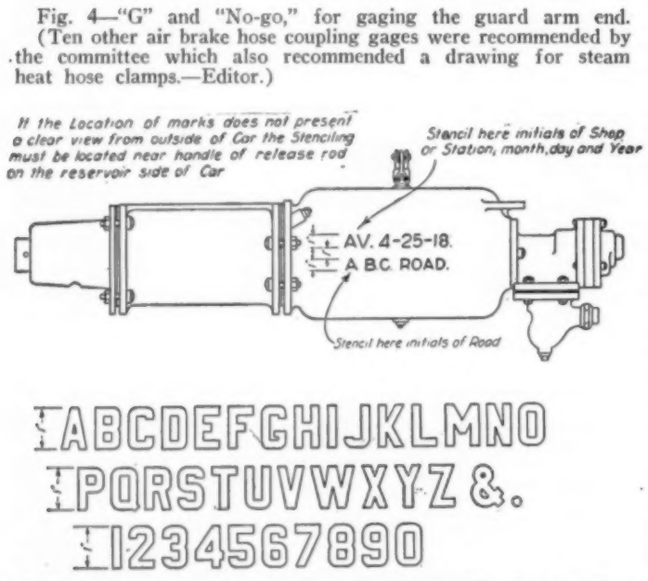

If the Location of marks does not present a clear view from outside of Car the Stenciling must be located near handle of release rod on the reservoir side of Car
Stencil here initials of Shop or Station, month, day and Year
AV. 4-25-18.
A.B.C. ROAD.
Stencil here initials of Road
ABCDEFGHIJKLMNO
PQRSTUVWXYZ &.
1234567890

Fig. 5—Revised Drawing for Stenciling Date of Brake Cleaning

A member has called attention to the fact that the cut showing stenciling for air brake cleaning shown in the Manual, the Interchange Rules and the Rules for Air Brake Maintenance shows a non-standard triple valve. This drawing has been corrected and will be shown in the next revision of these publications in accordance with Fig. 5.

The following interpretation relative to stenciling for air brake cleaning has been rendered by the Arbitration Committee (Cir. D. V. 438, January 15, 1926):

Rule 60. Q.—Some roads are using 1¼-in. stencils, others 1½-in., for air brake marking, while the rule specifies 1-in. height. Should such marking be accepted?

A.—The question of increasing the size of air brake stenciling is under consideration. It is suggested that a minimum of 1-in. and a maximum of 1½-in. be accepted as meeting present requirements.

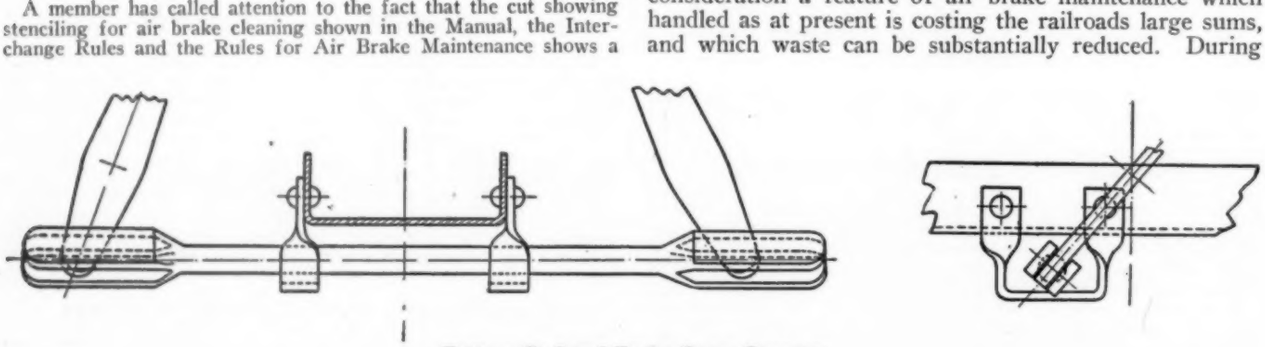
Your committee has conducted some investigations with reference to the elimination of angle cocks on passenger cars but before making final report request further time for investigation and study of this subject.

This report is signed by G. H. Wood (chairman), supervisor of air brakes, Atchinson, Topeka & Santa Fe; T. L. Burton, air brake engineer, New York Central; B. P. Flory, superintendent motive power, New York, Ontario & Western; J. M. Henry, general superintendent motive power, Eastern region, Pennsylvania; W. H. Clegg, chief inspector air brake car heating equipment, Canadian National; Mark Purcell, general air broke inspector, Northern Pacific; R. B. Rasbridge, superintendent car department, Philadelphia & Reading; and G. E. Terwilliger, supervisor of auxiliary equipment, New York, New Haven & Hartford.

Discussion

E. Von Bergen (I. C.): The Committee quotes the interpretation of the Arbitration Committee suggesting a minimum of one inch and a maximum of 1½ in. stencils be accepted as meeting present requirements. I can see no reason for departing from the one inch stencils that have been A. R. A. standard for several years. One inch letters, if decipherable at all, are practically as easily read by the car inspectors as 1½ in. A one inch stencil costs no more than a 1½ in. stencil, if as much. If there is any one item that can be standardized with exceedingly little effort, it is the air brake stencils. There is one feature in connection with these air brake markings, however, that calls for improvement. Many cars are found with markings on reservoirs that have been so exposed, to dirt and weather, they are illegible and much time is wasted in correspondence where occasion requires determining where the brakes were last cleaned. This also calls for the additional expense of cleaning the brakes when possibly they do not otherwise require it. I would recommend that the Committee consider this matter with a view of providing better protection for these markings. It would possibly correct this situation, if we abandon the location on the reservoir on freight cars, and use the location near the release rod on the side of the car altogether, which is now permissible where markings if stenciled on reservoir do not present a clear view from outside the car.

I take this opportunity to place before you for your consideration a feature of air brake maintenance which handled as at present is costing the railroads large sums, and which waste can be substantially reduced. During



Bottom Rod and Brake Beam Support

the past two years I have investigated hundreds of cases of brakes that have become defective and required annual repairs within 90 days after being previously stenciled. The principal cause found for this is leaky emergency rubber seats. It is true that some of these are caused by rust or pipe scale becoming imbedded in the rubber seats or metal seats of improper contour, but in view of the fact that a rubber seat costs approximately one and one-half cents, and requires only three or four minutes to apply, why should we take any chances on the judgement of the repairman. As the triple valves are in service from nine months to a year before becoming due for cleaning, and we know any rubber has lost much of its serviceability after this length of time, why take any chances to save a cent and a half. If 100 rubber seats were thrown away in order to eliminate one bad one, it would still cost far less than the cost accruing when a car inspector bad orders a car in a train for a defective brake, and it is switched to the repair track, and then found to require only a new rubber seat. Much expense can be saved by an A. R. A. rule requiring the renewal of the emergency rubber seat each time the triple valve is dismantled for cleaning.

The A. R. A. air brake maintenance rules provide that the brakes on the cars on the repair tracks be tested with a specified testing device. I believe it would be to our mutual advantage for the committee to recommend specifications covering a standard A. R. A. testing device which will include a service stability test, in order that this work will be uniformly performed on all roads. The incorporation of the service stability test would be of great value in detecting "dynamiters," which when they develop, cause serious trouble in long freight trains.

The railroads have spent large sums on air brake maintenance during the past two years, and the improvement in brake conditions has been little short of marvellous. The most annoying feature with which we must contend under the rigid requirements of 100 per cent operative brakes on trains departing from terminals is the inoperative brake found when train is due out. On fast freight trains with short standing time at Division Terminals, these cases assume serious proportions. It has been my observation that of approximately 9,000 brakes cleaned per month, approximately 300 had been previously cleaned within 90 days. It being necessary to clean these 300 on account of some defect rendering them inoperative, although very few of these could be attributed to faulty workmanship by repairmen. If we take into account those becoming defective during the period four to twelve months after cleaning, the percentage will no doubt be found much higher than we have heretofore believed. The expense of cleaning, lubricating, testing and stenciling brakes while cars are on the repair track for other causes is comparatively small, but when necessary to shop the car, and perhaps with important loading, the expense multiplies greatly. I believe our Brake and Brake Equipment Committee can render us a valuable service by making an investigation to determine if economy can be effected, by revising the present rule, which provides that brakes will be given annual repairs when the car is on the repair track and the stencil is nine months old or over, to provide for this work being done where car is on repair track and stencil date is four months old or over. If their investigation develops that such a rule would reduce the shopping of cars in train yards for defective brakes, to the extent that where more than enough expense from this source will be saved to warrant the more frequent repairs, such investigation will be well worth while.

W. F. Peck (B. & O.): We favor the adoption of the 10-20 spring type retainer with slow blow-down. Our present standard is the 25-50 lb. spring type, which we have found too severe under the present high standard of brake cylinder maintenance. Undoubtedly, a much more flexible control of the brakes will be obtained in descending undulating grades with the proposed design. Both of our heavy main line grades have flat spots, which are hard to negotiate with the 25-50 retainer. With the recommended design, it will also be easier to start trains when departing from wheel inspection stations on heavy grades. We are still experiencing difficulty with stretched springs which was covered by circular D.V.414; also plugged retainer vent ports. At stations preparing freight brakes for the descent of heavy grades, we examine each retainer spring and insert a wire in the vent port. Hundreds of stretched springs have been removed. When, where and by whom they are being stretched, we have been unable to determine. We would suggest that each road preparing freight cars for the descent of heavy grades examine the retainer springs at the stations where brakes are conditioned for this service. It would also be well to insure that trainmen are not stretching the springs or plugging the vent ports when the cars are picked up enroute.

We usually find stretched springs to be from ⅛ in. to ¼ in. longer than standard. With the 25-50 lb. type, this makes it possible to retain a brake cylinder pressure of 75 lb. This will depend entirely on the tension of the spring when stretched. Taking the proposed 10-20 lb. retaining valve, which is designated by Westinghouse piece No. 77,695, and stretching the high presure spring ¼ in. longer than standard, I found that the retained cylinder pressure was about 30 lbs. We feel that this is a recommendation for the proposed A. R. A. standard.

We are in favor of gaging hose couplings as proposed in the committee's report. An extensive investigation of brake pipe and brake system leakage conducted by the Air Brake Association discloses that hose coupling leakage is highly prevalent; in fact, is second only to that around the top of the angle cock key.

Mr. Smart: Cars equipped with bottom rods that do not pass under the bolster, under the spring plank, but pass between the strut of the bolster of the old simplex type, of through a cord member of the cast steel bolster, is that considered satisfactory as coming under this term: "Brake beam auxiliary support"? We have over 75,000 cars so equipped.

T. L. Burton (N. Y. C.): The reply to Mr. Smart's question will be found in recommendation one, of the report. That is, the recommendation is restricted to cars on which the bottom rod passes under the spring plank, and therefore is not directed to cars of a different type.

Mr. Tatum: Regarding this safety strap for brake beams and rods, I have been asked to ask for some information. The report was read and it was suggested that the words: "And brake beam" be omitted. Am I to understand that to mean that even though those words are omitted this safety strap under the rod will be considered a support for the brake beam?

Mr. Burton: I think the reply to Mr. Tatum's inquiry is found in paragraph 2-B, of the report.

Mr. Tatum: Then the elimination of these words have no significance?

Mr. Burton: No.

(A motion to refer the report to letter ballot was made and carried.)

Report on Couplers and Draft Gears

R. L. Kleine
Chairman

In order to obtain comprehensive information as to the service record of the present design of "D" coupler heads and shanks the individual members of this year's committee obtained from their respective roads data on failures which represent actual figures for about 38 per cent of the country's freight car ownership. The results of the analysis of these figures are given in the brief summaries embodied in the following abstract of the report. Among the striking results of the analysis are the figures which show, for one road, the relative number of failures per car-month of the present standard "D" coupler as compared with the former M. C. B. types. These figures indicate the greatly increased strength of the present type which in view of the fact that its service dates only from 1917, has not yet been in service a sufficient length of time to develop its ultimate service life.

The D coupler head was adopted as standard in 1916 and the 6-in. by 8-in. shank in 1918. Up to January 1, 1926, a total of 2,896,770 D couplers have been shipped by the manufacturers, including both the 6-in. by 8-in. and 5-in. by 7-in. shanks.

Information is not available to permit showing separately the number of D couplers of different shank sizes, but the total number shipped by years is as follows:

Prior to 1918	41,929
1918	148,777
1919	92,276
1920	309,541
1921	199,954
1922	472,866
1923	631,793
1924	464,689
1925	534,945
Total	2,896,770

In order to obtain comprehensive information as to how this complete design is standing up in service, the eight railroads represented on the Committee on Couplers and Draft Gears arranged for a special examination and report covering a period of six months during 1925 of all standard D couplers, including both the 6-in. by 8-in. and 5-in. by 7-in. shank sizes that, on account of failure of any kind, were removed from service.

The freight car ownership of the railroads in question is 38 per cent of the total of the country, and, as roads operating in mountainous as well as in level sections are included, the figures may be considered as representative.

The tabulations which were submitted with the report clearly show not only the number and location of the failures, but the year the couplers were cast and under certain groupings the capacity of the car from which the defective coupler was removed.

An analysis of these tabulations follows:

Failures of A. R. A. Standard D

There were 466 failures of heads and 1,106 failures of shanks on a total of 1,534 couplers with 5-in. by 7-in. shanks removed. Of this number 715 were unreclaimable and had to be scrapped. The remaining 819, practically all of which had bent shanks, were repaired and returned to service.

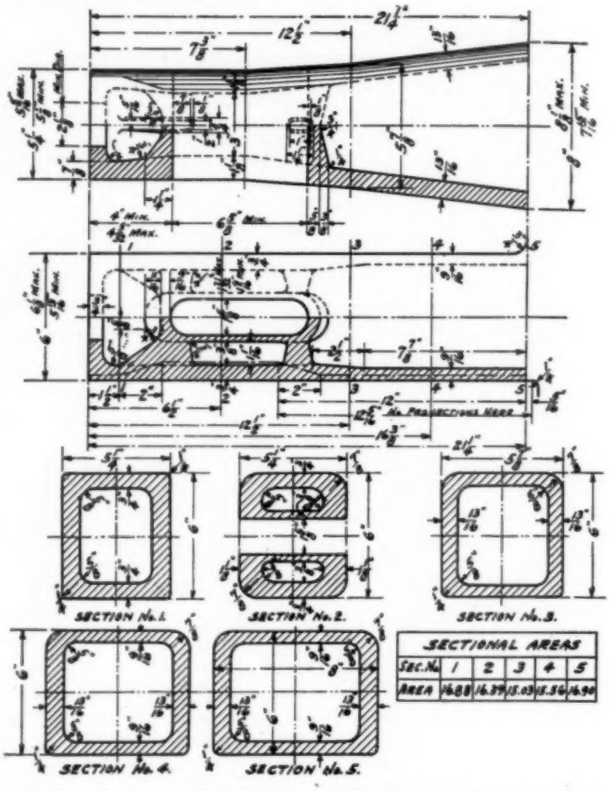
Of the 6-in. by 8-in. couplers there were 805 failures of heads and 141 failures of shanks on a total of 906 couplers removed. Of this number 884 were unreclaimable. The remaining 22, principally having bent shanks, were reclaimable.

Of the 5-in. by 7-in. shank-couplers 1,106, or 72.1 per cent, had shank failures while for the 6-in. by 8-in. size there were but 141 shank failures, or 15.5 per cent. As the heads of the two couplers are identical these figures clearly show the greater strength of the 6-in. by 8-in. shank.

The tabulations show a total for the six months period of 1,599 type D couplers that had to be scrapped on the eight roads reporting.

Amount of Variation in Inches from Normal Length of 21¼ In.

In order to determine to what extent coupler shanks are shortening or lengthening in service, the shanks of all defective couplers were measured where possible to determine the correct length, and their dimensions are given. While both shortening and lengthening is taking place, the shortening, as would be expected, is predominating, but is not serious, although it is highly desirable to limit this to a minimum.



Proposed Design of Standard 6-in. by 8-in. Shank for A. R. A. Type D Coupler

The standard tolerances permit ⅛-in. variation above or below the length of 21¼ in. which should be taken into account when considering the figures given.

Failures of A. R. A. Standard D Coupler Heads

All breakages of D coupler heads, regardless as to the size of shank, are shown in the tabulation of defects, the number of defective heads being given on the last line.

The total of 1,453 defects found in 1,271 heads may be grouped as follows:

	Number	Per cent
Guard arm	247	17.0
Face of coupler	696	47.9
Side wall knuckle tail cavity	370	25.4
All other locations	140	9.7
		100

During the latter part of 1917 a change was made in the design of the knuckle tail cavity so as to strengthen that part and again in 1925 a further slight modification was approved. Failures of this portion of the head are becoming much less frequent, as of the couplers cast in 1917 that failed. 86, or 48.5 per cent of the failures, were in this location, while for 1923 the figure dropped to 23, or 14.7 per cent, and for 1924 was 11, or 14.6 per cent.

Failures of A. R A. Standard D Coupler Shanks

There were 1,136 failures reported in 1,106 5-in. by 7-in. shanks. Of these 902, or 79.4 per cent, were bent shanks, the great majority of which were reclaimable. The remaining 234 failures were cracked or broken shanks, 89 or 7.8 per cent of the total being at the juncture of the head and the shank and 126 or 11.1 per cent through the key slot. Miscellaneous locations, 19 or 1.7 per cent.

There were 146 failures reported in 141 6-in. by 8-in. shanks. Of these defects 49 or 33.6 per cent were bent shanks, the remaining 97 failures being cracks or breaks located as follows:

	Number	Per cent
Juncture of head and shank	73	50.0
Key slot	19	13.0
Miscellaneous locations	5	3.4

Failure of A. R. A. Standard D Coupler Parts

The only detail part of which any considerable number was reported defective was the top lock lift. These were largely of the old design removed on account of wear from contact with the anti-creep ledge and replaced with the present No. 2 top lock lifter.

Copies of the tabulations, have been furnished to the Mechanical Committee of the Coupler Manufacturers Association for their information and consideration in connection with the study of coupler design.

In the 1913 report of the Committee on Coupler and Draft Equipment 5,698 steel coupler bodies removed from cars were reported as scrapped during the month of March, 1912, on the former Pennsylvania Lines East. During the six months period of 1925 covered by our study of failures of standard D couplers, there was an average of 73 failures a month of standard D couplers on the entire Pennsylvania Railroad.

In the former instance the Pennsylvania Lines East owned 159,910 freight cars, while in 1925 the number owned by the Pennsylvania that were equipped with standard D couplers was 116,970. On the basis of these figures there was a failure of one former M. C. B. type coupler per 28.1 car-months, whereas for the standard D coupler there was but one failure per 1,602 car-months, which is indicative of the greatly increased strength of the standard D coupler compared with the former M. C. B. types.

It should be borne in mind in the case of the standard D coupler that while some have been in service since 1917 the average length of time in service is not yet sufficient to develop their ultimate service life.

In a Supplement to the foregoing report is the following information on the preposed redesign of the shank on the 6-in. by 8-in. A. R. A. standard D coupler, and also reference to the special letter ballot which has been authorized on the adoption as standard of a draft key retainer.

Redesign of 6 in. by 8 in. Shank for A. R. A. Standard D Coupler

In order to prevent the gripping of the draft key passing through the coupler shank, due to the angularity of the coupler when passing over curves and the resultant lateral movement of the key which greatly aggravates the wear on the head of the key, draft castings, and cotters, as well as shearing of the latter, the Mechanical Committee of the Coupler Manufacturers Association was requested to submit a design for the 6-in. by 8-in. standard coupler shank having the key slot lengthened forward ½ in., thereby providing ⅝ in. clearance between the ends of the slot and the draft key in comparison with ⅛ in. as at present. It was also stipulated that the strength of the shank was not to be weakened thereby. They have submitted a proposed design to meet the above requirements, a drawing of which is shown.

Static tensile and compression tests indicate that the strength of this proposed shank is approximately 15 per cent greater than the present standard shank. The weight is estimated to be increased slightly over four pounds in connection with which the Mechanical Committee of the Coupler Manufacturers Association state that: "It is not expected that this small increase in weight will affect, in any way, a change in coupler prices, for the reason that the recommended design affords certain improvements in foundry practice from the standpoint of molding and a better or more uniform distribution of metal."

A better bearing relation with the draft key, on account of the key slot being completely shrouded with metal, is afforded and the small struts or columns connecting the key slot, shroud with the top and bottom walls of the shank are expected to improve foundry practice, and, at the same time, offer reinforcement against strains imposed on the coupler shank through the draft key.

Draft Key Retainer

In the report of the Committee on Couplers and Draft Gears, submitted to the 1925 Convention, reference was made to the failure of cotters securing draft key. Failure of these cotters results in a serious condition as there is then nothing to prevent the draft key from working out of place. When this occurs, the coupler is pulled out and falls on the track, frequently causing derailment.

The inadequacy of the cotters in general use for securing draft keys is further indicated by the fact that many roads are applying to their own cars other devices to retain the draft keys in place. The greater number of these special draft key retainers while effective, are in some cases felt to be unnecessarily expensive and difficult of application to existing cars.

In order to correct the condition that now exists and that the movement and repair of cars may not suffer from their coming into use a multitude of different designs of draft key retainers, it is desirable that a standard be adopted at an early date, it being understood that the adoption of such a standard would not preclude the use of other equally satisfactory retainers.

[A drawing showing a proposed design of a standard draft key retainer is embodied in the supplement to the report. This was submitted to special letter ballot for adoption as standard on May 5, and the ballot closed June 5.—Editor.]

The report was signed by R. L. Kleine (chairman), assistant chief of motive power, Penn.; C. P. Van Gundy, engineer of tests, B. & O.; C. J. Scudder, superintendent motive power, D. L. & W.; J. A. Pilcher, mechanical engineer, N. & W.; C. B. Young, general mechanical engineer, C B. & Q.; S. Lynn, master car builder, P. & L. E.; L. P. Michael, mechanical engineer, C. & N. W.; E. A. Gilbert, general master car repairer, S. P.; and Prof. L. E. Endsley, University of Pittsburgh.

Discussion

H. W. Faus (N. Y. C.): The draft gear drop test machine which was recently authorized by the Association to be installed at Purdue University is refered to in this report. Here and there one hears repeated the familiar assertion that laboratory tests are of little or no value and that it is the service test that counts. It sounds plausible enough to hear a manufacturer say that his gear is designed for service and not to withstand the blows of a drop hammer in a laboratory. This is easy to say but difficult to prove.

Before any weight could be given to such an assertion it would be necessary to have it supported by a complete record covering the entire life of a large number of gears. This record would have to show exactly how many packages of lading had been damaged in the cars which these gears were designed to protect, and also how much damage the cars themselves had suffered, not overlooking the fact that the latter damage might appear indirectly in the form, for instance, of a leaky roof caused by distortion of the car body. If anyone had such information regarding all of the various freight car draft gears in use to day, laboratory tests would be unnecessary.

Unfortunately it is not practicable for all railroads, nor for any railroad, to keep a record of the performance of its freight car draft gears in actual service and even if such a thing were practicable it would be many years before definite conclusions could be drawn.

Laboratory tests have their limitations, to be sure, but there are many things that it is desirable to know about a draft gear that can be learned in the laboratory.

A. R. Ayers (N. K. P.): Failures of "D" Couplers divided according to the year cast, compared with the number cast each year, indicate that in the year 1925 only three-quarters of one per cent of the couplers cast in 1918 were removed defective, after seven years of service, one-half of one per cent of those cast in 1920 and one-third of one per cent of those cast in 1923.

These figures indicate, that the number of removals increases with the age of the couplers, but they also show that the increase is not at all serious.

Figures in exhibit "E", of the report, indicate the average life of the former MCB couplers on the Pennsylvania was about 4½ years, while the expected life of the "D" coupler, based on performance up to date, will be many times that amount.

The report shows that still further refinement can be and is being made in the design of certain details of the "D" coupler which will lead to still better service.

All this seems to mean that the serious troubles have been transferred from the couplers to the coupler attachments and draft gears, and attachments.

Best results with couplers and draft gears are obtained when the shocks are carried in a straight line through the center line of the couplers and draft gears, and it is

coming to be widely accepted that the striking plate is only an emergency protection, and should not come in contact with the coupler horn, except in the event of failure of some part.

The clearance between coupler horn and striking plate should be sufficient to allow for slight upsetting of parts and reasonable variation from nominal size of parts without allowing coupler horn to come in contact with striking plate when draft gear is fully compressed.

This, of course, requires draft gear housings to be sufficiently strong to develop close to the full strength of center sills, without injurious distortion.

It is interesting to note that the new draft gear drop test machine, which has been ordered, is to be provided with a 27,000 ib. weight.

A 9,000 lb. weight, falling from a height of 30 in., will reach a speed of 8.65 m. p. h., which is beyond the speeds commonly attained in switching, and to that extent causes draft gears to function at higher speeds than they customarily reach in service.

The 27,000 lb. drop will provide the same energy falling from a height of 10 in. which is equivalent to 4.98 m. p. h., and is more nearly in line with service conditions.

Much thought is being given, at the present time, to the formulation of schedules for drop tests of draft gears which will be equivalent to the continuous small movements which draft gears get in service, as well as the occasional heavy shocks, and, in this way, develop the endurance qualities as well as the wearing qualities of the gears.

Mr. Brazier: I would like to make a motion, as this is a standing committee, that this be considered as a progress report, and the matters pertaining to letter ballot, be submitted to letter ballot.

The motion was carried.

The third session of the convention adjourned.

The convention is adjourned until Monday morning at 9:30.

Registration, American Railway Association

(*Continued from Page* 1711)

Mendler, C. H., Supt. Car Shops, N. Y. C., Ritz
Messimer, W. N., Asst. Div. Gen. Car For., N. Y. C., Ritz
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Mills, C. C., G. M., Unity, Strand
Moler, A. L., Supvr. of Lub., C. & O., Princess
Motheral, Geo. B., Director, P. & L. E., Ambassador
Murray, Geo. E., Mech. & Elec. Eng., G. T., Marlborough
Myers, H. E., M. M., L. V., Dennis
Nash, E. E., Ch. Oper., M. & St. L., Marlborough
Parrish, J. B., Gen. Mgr., C. & O., Marlborough
Peach, John F., Supvr., M. of E. S. & E., Shelburne
Peahler, F. P., Asst. to Ch. M. P., S. A. L., Strand
Plummer, K. V., Spec. Rep., Pac. Frt. Exp., Traymore
Pollard, H. D., V. P. & G. M., C. of Ga., Strand
Pollock, B. R., V. P. & G. M., B. & M., Traymore
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Ronlads, Hugh, R. F. of E., L. & N. E., Green Gables
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Roush, C. S., Asst. M. M., Penna., Dennis
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Ryan, H. A., Gen. For., D. L. & W., Haddon Hall
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Shapiro, L. D., E. J. & T., Brighton
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Shepherd, J. E., For., C. of N. J., Sterling
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Smith, E. W., Gen. Supt., Penna., Haddon Hall
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Snyder, F. I., G. M., B. & L. E., Strand
Snyder, Rudolph, Insp., Penna.
Squires, W. G., M. M., N. Y. N. H. & H., Haddon Hall
Steen, Asst. Road For. Eng., Penna.
Stein, C. H., Asst. to Sr. V. P., C. R. R. of N. J.
Strachan, G. M., Asst. Eng., A. T. & S. F., Strand
Sumner, A. W., Gen. For., Penna., Dennis
Swentzer, F. W., Mech. Supt., N. E. Trans. Co., Marlborough
Trout, H. E., V. P., C. & B. L., Ambassador
Vaught, C. K., Insp., M. P. D., Penna., New England
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Warthen, H. J., S. M. P., R. F. P., Haddon Hall
Weightman, J. J., C. C. M. P., P. & R.
Whitaker, Draftsman, N. Y. C.
Whitzell, Thomas W., Blacksmith Helper
Wilkins, Harry T., Mgr. R. R. Exhibits, Penna., Elaine Apts.
Williams, D. T., Asst. M. M., P. & R.
Wilson, F., M. M., I. C., Princess
Wilson, G. T., Gen. Shop & Equip., N. Y. C.
Wood, J. H., Supvr., A. T. & S. Fe
Woods, C. K., Asst. S. M. P., P. M., Chalfonte
Williams, A. J., Ch. A. B. Insp., Penna.
Wray, P. C., Shop Supt., N. Y. C., Shelburne
Yergy, John P., Gen. For., W. J. & S. S., Penn. Alto
Young, Jr., James, M. M., Penna.

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Diehl, W. J., P. A., M. & O., Knickerbocker
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McCloy, Edward J., S. K., P. & R.
Meehan, Jr., W. J., Off. Insp. Stores, Penna.
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Murphy, T. J., Asst. to P. A., B. & O., Strand
Rank, G. G., Req. Marker, Penna.
Remensnyder, E. J., Asst. P. A., Penna., Ambassador
Savage, T. E., Asst. Mgr. of Pur., Erie, Ritz
Sickel, Samuel R., Ch. Cl., P. & R.
Steele, E., Ch. Cl. Cat. Bur., Penna.
Stewart, A. D., S. K., N. & W., Knickerbocker
Telford, A., Asst. G. P. A., So., Traymore
Vogt, W. F., Asst. Gen. S. K., Penna.
Warnock, W. J., Scrap Sales Agt., N. Y. C., Traymore

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Albert, Geo. E., Expediter, Pur. Dept., Penna.
Allison, E. V., Insp., Penna., New England
Askew, J. L., M. P., Llewlyn
Bade, L. W., Asst. Genl. Pass. Agt., Wabash, Royal Palace
Barkhan, G. A., Mach., C. C. C. & St. L.
Bartlett, Jno., Insp., Penna.
Bechtel, Howard J., Machinist, P. & R.
Blech, G. J., Asst. G. F. Agt., So. Pac., Ambassador
Bowmaster, J. O., For., East Broad Top, Trexler
Bradley, E. J., Ret. For., Penna.
Brutsche, H. A., Cl. Pur. Dept., Penna., Traymore
Cardegna, Frank A., Draftsman, B. & O., Louvan
Carney, Charles T., Supt. Rolling Mill, B. & O., Knickerbocker
Carrow, T. H., Supvr. Safety, Penna.
Cornell, X. H., Term., C. & A.
Cromleigh, G. W., For., Penna.
Curry, R. D., Gang For., Penna.
Edwards, Charles, Asst. For., L. I.
Ermentrout, George J., Insp., P. & R.
Filskov, H., Asst. Supt., Raritan River
Fishman, J. B., N. & W., Haddon Hall
Flickinger, D. E., Pur. Dept., Penna.
Geisking, H. W., For. Mach. Shop., Penna.
Gilland, Jr., J. M., Asst. to G. M., P. & R.
Goings, C. E., Sig. Eng., Penna.
Hawman, Allen M., Ch. Cl. S. M. P., P. & R.
Heiser, Charles E., Asst. E. E., P. & R.
Herncane, S. J., Train Control Supvr., P. & R.
Hertz, D. E., Dist. M. P., Insp., B. & O., Princess
Hill, Raymond Andrew, Editor, Broadwalk Ill. News
Hillebrand, W., Car Light For., C. of N. J.
Hinkel, George C., Draftsman, B. & O., Louvan
Hoffman, W., Main. For., C. of N. J.
Hoffmaster, S. W., Cl., P. & R.
Holzbach, J. A.
Hunt, Roland, Haddon Hall
Hurd, T. H., Gang For., Penna.
Jordan, Chas. A., Draftsman, C. & O., Princess
Josh, Arthur C., Insp. of Trans., P. & R., Ritz
Kammer, Louis S., Cl., P. & R.
Kelly, A. B., Ind. Eng., D. L. & W., Grand Atlantic
Kennedy, W. G., Clerk, Penna.
King, Garnett, Asst. to Pass. Frt. Mgr., So. Pac., Ambassador
Longacre, W. E., Asst. For., P. & R.
Magrum, Chas. J., For., N. Y. C., De Ville
McCabe, B. T., Sec. for A. R. A., Haddon Hall 1120
McCloy, Harold
McCrackan, W., Gen. Agt., Wab.
McGlensey, E. C., Car. Insp., Penna.
McHugh, T. J., Secy. G. S. M. P., B. & O., Princess
Mohr, E. D., Commerce Att., L. & N., Raleigh
Moore, H. H., Cl., Penna.
Morningstar, Edward, Draftsman, B. & O., Louvan
Mull, John, Road For. Eng., P. & R.
Neely, Frank Tennyson, Ambassador
Nordheimer, A., Draft., N. Y. C.

Purchasing and Stores Officers Close Seventh Annual Meeting

Sustained interest characterizes last day's session. Curtis elected chairman

THE third and last day's session of the seventh annual convention of Division VI—Purchases and Stores of the A. R. A., was brought to a close on Friday after a session which showed no diminution of interest and no appreciable decrease in attendance from that characterizing the meetings of the two preceding days. The meeting was opened at 9.15 a. m. with Chairman C. D. Young presiding, and continued until noon, during which reports were presented as follows: Unit Piling and Numbering of Material; Purchasing Agents' Office Records and Office Organization; Store Delivery of Material to Users at Shops, with a supplementary paper on the subject by G. W. Gerber; Control of Line Stocks; Supply Train Operation and Line Delivery of Material; and Fuel Conservation.

The election of officers resulted in the selection of D. C. Curtis, chief purchasing officer, Chicago, Milwaukee & St. Paul, for chairman, and for vice-chairman, A. S. McKelligon, general storekeeper, Southern Pacific, Coast Lines.

Convention Exhibitors Praised

Following the opening of Friday's meeting and previous to the presentation of the committee reports, Leroy S. Wright, president of the Railway Supply Manufacturers' Association, in charge of the exhibits of railway supplies and equipment on display at Atlantic City, was invited to address the association. Chairman Young, introducing Mr. Wright, spoke in part as follows:

It was my pleasure on Wednesday afternoon to make a tour of the exhibits. I was astonished and delighted to see the growth of the exhibits. In space alone there is an increase of at least 30 or 35 per cent.

The genius represented by this exhibit is with us this morning, and I am taking the liberty of extending the floor to the chairman of that group which has made this exhibition and our entertainment here possible. It gives me great pleasure to introduce the chairman of the Railway Supply Manufacturers' Association.

L. S. Wright (National Malleable & Steel Castings Company): I want it known that I appeared here at the opening day of your convention, but after a very few moments observation, found it was no time to interfere with the meeting you were holding and, therefore backed out. I take the opportunity now of coming before you get settled down to your business.

I think we all appreciate the growth of the three or four organizations which have participated in these conventions in recent years, and it is very gratifying to all concerned to note the success which has attended our efforts in providing an exhibition worthy of these conventions.

Unit Piling and Numbering of Material

J. W. Wade
Chairman

In reflecting upon the remarkable transformations which have taken place in the appearance of storehouses and material yards it appears that the prominent position given to the principle of unit piling as a cause factor has not been unduly emphasized. The wide-spread applications made of it is in itself convincing evidence of the recognition this method of storing material has won as an aid in supply operatins and control. It also reflects the effectiveness of the reports which committees have prepared on this subject from year to year. Like every system which has experienced so rapid a growth, however, progress in unit piling has approached a stage where special value is placed upon information concerning its application to specific problems and its limitations and it is in this direction that this committee has addressed itself this year with its discussions on the extent of use, cost of installation, etc.

Previous reports on this subject have conclusively shown that the system of unit piling is very well established on most railroads, and it was therefore decided that the work of your committee would be centered on obtaining first-hand information as to the extent unit piling should be carried.

Investigation of the committee on the majority of the roads indicated that the system was employed throughout the entire store only on a few roads, most of the lines visited using the unit piling system only on materials easily piled, such as bolts, pipe fittings, valves, small castings, lumber, etc.

On the roads where unit piling is employed throughout, the tray system, showing cumulative count, is generally used; and the larger items are piled in units, also carrying cumulative count,

Metal Bin Dividers on the Denver & Rio Grande at Salt Lake City, Utah

which assists very substantially in rapid and accurate monthly stock checking, and annual inventory.

On several roads visited the system of unit piling was viewed favorably, with progress in installing as rapid as conditions would permit.

Cost of Installation

Investigation indicated that there was little or no additional expense incurred in unit piling materials, the major portion of the work being performed by regular storehouse forces; and in most instances metal trays and markers were made from old car roofing.

Various practices were found in relation to the use of bin dividers for conserving space. Several roads were making extensive use of the metal bin dividers, same being applied to wooden material racks. Other roads had recently completed new storehouses, fully equipped with steel shelving, which provided for the insertion of steel dividers at any height desired, allowing for the conservation of space both vertically and horizontally. On another road the standard shelves are constructed with 30-inch pockets and material divided by trays and metal separators with view of conserving space.

Investigation of the practices in storing materials received in standard packages, cases, kegs, etc., shows that these containers are not broken open to permit of unit piling of contents, but are unit piled on shelves or island platforms in the original package.

It is not thought an economical practice to break open standard packages, cartons, etc., simply to unit pile the contents.

Unit Piling of Unbroken Packages is Practised on the Wabash

Your committee recommends that railroads consider purchasing smaller commodities such as cotters, stove bolts, lamps, etc., in standard packages.

Your committee also recommends unit piling in all its economical phases; and further recommends that the Committee assigned to this subject for the year 1927 devote particular investigation to the best recognized practices in use of metal trays, containers, bin dividers, etc.

Numbering of Material

The investigation made by the committee on roads visited indicated that no particular numbering system was employed on the majority of them, other than the use of manufacturers' reference and piece numbers; also pattern numbers were used on brass, malleable, grey iron and steel castings, tires, axles, and crank pins. One road reported using identification numbers on electric locomotive parts only; on other materials pattern numbers and manufacturers piece numbers only were used. On another road reference numbers were employed to provide a rapid index for locating items in the stock books; this reference, however, did not have any bearing on the accounting for material.

The Style of Numbering Used on the Norfolk & Western

The entire investigation on roads visited indicated that with

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Purchases and Stores Officers Attending Annual Convention at Atlantic City.

possibly one or two exceptions the numbering system was not advocated. On roads using the system it was stated that it provided for a quick identification of any piece of material, afforded quick means of determining the location of material, and facilitated reference to accurately identifying the item when talking, ordering or writing about it. It was also stated that the system carried to its fullest extent promotes efficiency in keeping the records up to date with the least expenditure of effort.

The similarity of names for two pieces of material used for an entirely different purpose is often confusing and affords many opportunities for error; but where each piece is further identified by a permanently assigned number, the chances of error in either issue, shipping, or accounting are materially lessened, or at least reduced to a practicable minimum.

The numbering system has been found, by roads using it, to be advantageous when promoting or changing sectional stockkeepers. Every stores department officer knows that this is always a trying time in the section, as the new man replacing the old employee does not always have the experience required to give the correct name and use of the material in his section. By having stores item numbers assigned to each piece of material he is able to acquire this knowledge and adapt himself to the new surroundings with the least possible confusion.

Assigning item numbers to stock materials has not only proved to be an advantage to the stockkeepers, on road using the system, but it has also been found to be an essential factor in the accounting department. By this system, an item may have many names, but it can only have one correct item number. This insures accurateness in accounting with the least possible effort, the item number serving as a rapid means of identifying the material in the pricing record. Where used with the visible pricing system, the numbering system has proved an added advantage in accounting, enabling the determining of a price at a glance.

Both unit piling and numbering of material, serves to reduce effort, which tends to promote efficiency, accuracy and minimize error; economize time, and centralize supervision. All of these have a tendency to decrease expense of operating.

The committee has decided in view of the wide range of various systems in use in identifying materials by a reference number, to make no definite recommendations as to the adoption of any particular system of numbering of material.

Committee: J. W. Wade, general storekeeper (N. & W.), chairman; O. V. Daniels, general storekeeper (Penn.); R. J. Gable, division storekeeper (I. C.); V. E. Johnson, traveling storekeeper (D., L. & W.); F. J. McGuiness, division storekeeper (D. & H.); E. G. Roberts, division storekeeper (C., R. I. & P.); F. C. Warren, general storekeeper (St. L. S. W.), and D. C. Curtis, chief purchasing officer (C., M. & St. P.), chairman ex-officio.

Discussion

E. W. Peterson (B. & A.): Is it necessary to have the item number on such items as bolts, nuts, washers and cotter-pins?

Chairman Wade: We have found it advantageous to have our own item number on every item of material carried in stock. It serves as a page number, and the materials are located numerically in the store-house and with the class of labor handling those materials, we find that we can educate by numbers much better than by specifications. We use it on bolts, studs, or any item we carry in store-house stock.

E. H. Nicodemus (Penna.): We have what is called process shops, where the repairs to certain types of steel cars, largely of 140,000 lb. capacity, are made. At one store-yard, in particular, we have a turnover of about $250,000 of material a month. We have reached the point at two locations where the material is piled and properly marked with reference numbers. At these two locations, we take a weekly inventory, starting Monday morning and throughout that week. Every item of material is counted for the benefit of the ordering clerks and accounting department as well, charging that material out. The numbering of the material in this yard has made that possible.

Recently, we began a campaign to educate the shopmen to the use of a reference number rather than a descriptive name. It is gratifying to know that the shops are co-operating to the extent that they are now using our reference number in connection with the sheets.

J. J. McKinnen (B. & M.): I think if we try this system of numbering in our forging section alone, it will pay its own way.

Mr. Elliott: We find that this item number, identification number, or reference number, is particularly of value when using unskilled labor. Many times conditions arise where the skilled man cannot always be present in unloading cars and see to placing material in its proper location in the bins. By the use of the reference number and the fact that the number appears on the requisition, the skilled man can identify material in perhaps 10 or 15 minutes by marking one of each item in the lot, indicating to the unskilled man who is always familiar with numbers just what that material may be.

There being no further discussion the report was adopted as read.

Panorama Taken in Front of Haddon Hall Following Adjournment Thursday.

Purchasing Records and Organization

P. L. Grammer
Chairman

Purchasing agents' office records and office organization are among those subjects receiving the attention of the Association which neither lend themselves to the picturesque in treatment nor the inspirational in substance, but which rather invite consideration for the foundations that are provided upon which to build and sustain efficient departmental functioning. In pursuing its work this year the committee has endeavored simply to carry forward its programs of previous years by perfecting forms that have been developed in the past for use in prescribed branches of purchasing and by pointing out weaknesses in current practice. This year's report is especially interesting for the progress it reveals in the adoption of the standard invoice form which is now in use on 55 railroads and by approximately 230 manufacturers furnishing the materials to railroads. P. L. Grammer has completed his first term as chairman of the committee and his second year as a member.

It is recommended that Form 12-16—Purchasing Department Statistical Record—be changed as per draft sub-joined with descriptive headings arranged horizontally at the top and with the months listed at the left side in perpendicular arrangement, making the size 8½ in. by 14 in.; subject to modification, to accommodate additional headings where desired. (See illustration.)

This is a form of considerable importance and the headings have been revised to make it applicable on all roads.

To assist in extending the use of the standard invoice form, it is recommended that the following additional paragraph be added to the printed instructions: "Bill on National Standard Invoice Form in original and (each road to designate here number of copies required) copies."

Standard Invoice Form

Your committee finds that the use of the standard invoice form is steadily increasing and that it has now been adopted as a standard form by about 55 railroads representing approximately 198,000 miles, also by approximately 230 manufacturers and selling organizations which are now furnishing these forms at their own expense. The Committee recommends that all purchasing departments use their best efforts to increase the general use of this form and feels that this can best be done by the following methods:

1. By strict adherence to the original draft of the form as originally approved.
2. By bringing to the attention of sellers not using the form, the advantages which will follow universal adoption.
3. By arranging with the different representatives of billing machines to have such machines adapted to the use of the form.
4. By furnishing samples of the form to sellers where requested, and by supplying information, where desired, as to sources of supply from which the forms can be purchased.

Catalogues

The committee feels that there is need for a standardization in the sizes of trade catalogues so as to facilitate filing and to make them more easily handled to obtain information as required. As it is understood that a movement is now under way for the standardization of trade catalogues to the size 7¾ in. by 10⅝ in., it is recommended that the various purchasing departments use their influence in favor of such standardization.

General Recommendations

The following methods of handling certain details in connection with purchasing department work have been found, by departments now using them, to be an improvement on former practices.

Requisition—Order Form: The committee recommends that all purchasing departments give consideration to the use of such a form, which is already being used more or less extensively on a number of railroads. The use of this form has been found to lead to the following economies:

1. Elimination of writing and checking orders against the requisition in the purchasing department.
2. Reduction of time necessary to get orders into the hands of the sellers.
3. Economy in filing and handling hurries for material. The purchasing agent's office copy of the order being also the requisition, one file is dispensed with, and the requisition number is also the order number.

TABLE I - BOILER LAGGING, FLAT AND CURVED

1"x6"x36" 1-1/4"x6"x36" 1-1/2"x6"x36"
2"x6"x36" 2-1/2"x6"x36"

TABLE II - CARRIAGE BOLTS

Diam. Inches	LENGTH, INCHES																													
1/4	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2		3	3-1/2	4	4-1/2	5	5-1/2	6														
5/16	1		1-1/2		2		2-1/2		3		4																		
3/8	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-3/4	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	9-1/2	10		11	12				
1/2	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-3/4	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	9-1/2	10	10-1/2	11	12				
5/8									3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8											

TABLE III - SQUARE HEAD MACHINE BOLTS

Diam. Inches	LENGTH, INCHES																															
1/4	1	1-1/4	1-1/2		2		2-1/2	3	3-1/2	4					6		7		8	9												
5/8	1	1-1/4	1-1/2	1-3/4	2		2-1/2	3	3-1/2	4	4-1/2	5			6		7		8	9												
1/2	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	9	10	11	12											
5/8			1-1/2		2		2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	9	10	11	12	13	14	15	16	17	18					
3/4					2		2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
7/8					2		2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1								3	3-1/2	4	4-1/2	5	5-1/2	6		7		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1-1/8										4		5		6		7		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1-1/4														6		7		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1-3/8																					11	12	13	14	15	16	17	18		20	21	22	23	24
1-1/2																														21	22	23	24
1-5/8																															22	23	24	25
1-3/4																																	

TABLE IV - LOCOMOTIVE BOILER RIVETS

Diam. Inches	LENGTH, INCHES																															
3/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-3/4	3	3-1/4	3-1/2	3-3/4	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8													
7/8			2	2-1/4	2-1/2	2-3/4	3	3-1/4	3-1/2	3-3/4	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	9-1/2	10									
1					2-1/2	2-3/4	3	3-1/4	3-1/2		4	4-1/2	5	5-1/2	6																	
1-1/8							3		3-1/2		4	4-1/2	5	5-1/2	6																	

TABLE V - STRUCTURAL RIVETS

Diam. Inches	LENGTH, INCHES																															
1/4	3/4		1		1-1/4		1-1/2			2		2-1/2		3																
3/8	3/4	7/8	1	1-1/8	1-1/4		1-1/2		1-3/4	2	2-1/4	2-1/2	2-3/4	3																
1/2			1	1-1/8	1-1/4	1-3/8	1-1/2	1-5/8	1-3/4	2	2-1/4	2-1/2		3		3-1/2		4	4-1/2											
5/8							1-1/2		1-3/4	2	2-1/4	2-1/2	2-3/4	3	3-1/4	3-1/2		4	4-1/2	5	5-1/2	6	6-1/2	7						
3/4							1-1/2		1-3/4	2	2-1/4	2-1/2	2-3/4	3	3-1/4	3-1/2	3-3/4	4	4-1/2	5	5-1/2	6	6-1/2	7						
7/8										2	2-1/4	2-1/2	2-3/4	3	3-1/4	3-1/2	3-3/4	4	4-1/2	5	5-1/2	6	6-1/2	7						
1																3-1/2		4	4-1/2	5	5-1/2	6							

The New Form Proposed for Statistical Records

Standard Order Form (12-4) can readily be adapted for use as a requisition order form by providing for the signatures of stores or other officers on the purchasing agent's office copy of order and by arranging for such additional copies of the form as may be required. In some organizations this form is prepared economically and advantageously by a bureau handling typing and mimeographing for both purchasing and stores departments.

Order Number: A number of carriers which have not adopted a requisition-order form are using the requisition number as an order number and find that it works out advantageously in the simplification of filing and in the identification of the materials when received by the stores department.

Shipping Instructions: It is a general requirement that the shipper place the order or requisition number on the material or on the containers in which the material is shipped, in addition to the shipping instructions which are specified on the order. Some carriers are now using the following method of showing shipping instructions on orders, to obviate the trouble experienced through failure of shippers to show the order number on the shipments, and are also including in shipping instructions station or storehouse numbers, to designate destination more accurately.

Example:—Consign to North & South Railroad Company,

c/o Storekeeper (add order number here).
Station (or Storekeeper) (add number).
St. Louis, Mo.

Committee: P. L. Grammer, assistant to purchasing agent (Penn.), chairman; J. J. Bennett, purchasing agent (I. C.); J. W. Corbett, purchasing agent (C. N.); D. V. Fraser, assistant purchasing agent (M.-K.-T.); L. V. Guild, purchasing agent (O. S. L.); H. Hansen, assistant purchasing agent (N. P.); W. H. King, Jr., assistant to vice-president (S. A. L.); B. B. Melgaard, assistant to purchasing agent (C., M. & St. P.); H. M. Rainie, chief price clerk (P. D.), (B. & M.); B. T. Wood, vice-president and chief purchasing officer (St. L.-S. F.); and W. S. Galloway, purchasing agent (B. & O.), chairman ex-officio.

Discussions

J. W. Hagerty (Penn.): While the requisition order form is comparatively new in railroad practice, it is not new in the commercial field. A fan-fold form similar to the present A. R. A. order form is used by a company which has 28 or 30 ordering points, and I believe that there is considerable merit in the requisition order form.

C. J. Mackie (C. B. & O.): I think all of the storekeepers present have had trouble in trying to check material received from the dealers when the order number is not a part of the information shown on the shipment. I believe that one thing which is helping to overcome that difficulty is, first, making the requisition number the purchase order number for the dealers, and then making that order number a part of the shipping directions, so that the way-bill and the bill of lading and the markings on the packages of L. C. L. shipments will include the order number against which the material can be checked at destination.

Mr. Garland: The committee says that 230 firms have adopted this form, and this is remarkable considering the short time that it has been in existence. I find that about 300 firms at the present time are using the form against some of our shippers, and that is more remarkable when you consider that firms selling diverse lines such as department stores, are taking this form and putting it into effect. I find that fully 25 per cent of the invoices received by some of the carriers are on the sellers' own forms, furnished by them. I think a word of commendation is due to some of our dealers for the remarkable way in which they have taken this form and used it.

You will find that they are taking the form exactly as it is, without the modifications, and also using the minimum size. That is quite a remarkable concession for some of them, because it is difficult for them to adapt their system to what the purchaser requires. You will find that if we ask the printers to stock these forms we can help ourselves materially. I find the biggest help in forwarding this movement is for purchasers to have printed on the face of their order form "Render invoice on National Standard invoice form."

O. Nelson (U. P.): I infer that it is not the regular practice to show the section number in addition to the destination. On the Union Pacific we have succeeded in getting our people to show also the section number on their orders, and the material comes to us with that information. By having this information, we are able to take these shipments directly to the section where they belong.

C. D. Baldwin (Bangor & Aroostook): We have until perhaps a year and a half ago, been using our own invoice form, but in the interest of this movement, we changed that and started using the standard invoice form. The recommendation made about strict adherence to the original draft of the form is one thing with which we have had a little difficulty. Some manufacturing concerns or sellers have sent us a form and asked us if it would be agreeable to have bills rendered on that form. In checking it over, we find that they have made some variations, and I have made it an invariable rule to write back and tell them that if they would use the standard form without any variations we will be glad to accept it.

The report was accepted as read.

Delivery of Material to Users at Shop

H. C. Stevens
Chairman

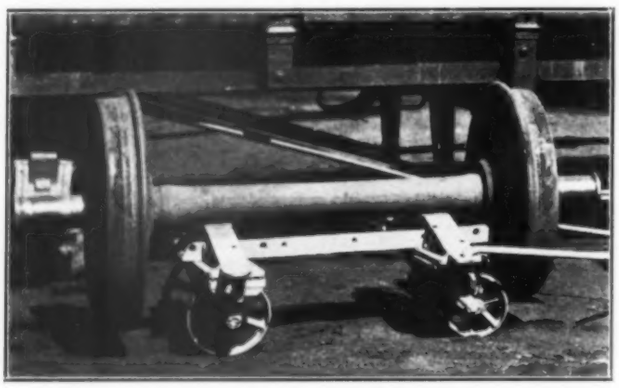
Stores' delivery of material is relatively an old subject to the Association, committees having brought in reports on it for several consecutive years. These reports have repeatedly endorsed the practice and much information has been contained in them on the numerous advantages said to result from such methods of distributing material. In this year's report the committee finds that 47 out of 57 roads employ it to some extent. With this progress, recent committees have directed increasing attention to the causes of skepticism, where encountered, and to such other lines of investigation that disclose methods of rendering the practice more useful and economical. This year's report emphasizes that departmental co-operation is essential to successful stores' delivery and it is distinguished by the detailed description of the method by which one road arrived at a saving of $40,000 per year from the practice. The value of telephones in this work is also discussed and a résumé given of experiences obtained from various types of equipment. H. C. Stevens is completing his first year as chairman of the committee.

To determine progress and expansion during the past year a questionnaire was addressed to 57 representative railroads. A total of 48 replied, indicating the interest that prevails in this subject at the present time. It was found that of the 57 railroads, 47 had shop delivery to some extent and to some branches of the service. One was considering its inauguration within the very near future. Six railroads have inaugurated stores delivery of materials to shops during the past year and two have inaugurated inter-shop delivery by stores forces. None discontinued it during the year.

The replies indicate an increased satisfaction by mechanical employes and officers where store delivery of material has been installed and constantly followed by stores representatives to improve and give maximum service.

There seems to have been some skepticism on the part of mechanical officers as to stores rendering them better service than could be rendered by their own employes. This is generally due to lack of consultation between the officers of both departments prior to or at the time of inauguration of this method, and through failure of all to cooperate toward the common end.

Where stores forces are depended on for delivery of materials, failures are generally complained of promptly and corrected. This results in a saving as compared with the old



A Trailer Improvised for Handling a Pair of Wheels

method where show deliveries or failures to get what is needed promptly were seldom heard unless discovered by an officer in charge in connection with investigating delays to work.

Stores delivery, properly performed, improves the morale of interested workmen. Men will universally perform more and better work if needed materials are delivered on an efficient, thoroughly understood basis than if they are compelled to drop the work in hand and go or send across the yard to a storehouse for something that is needed to enable them to proceed. The majority of the working forces are usually interested in doing the work in the most profitable way where there exists the proper spirit on the part of the supervising leadership.

Savings

On one road where it was established at one locomotive shop handling approximately 4500 orders per month, employing approximately 700 men, a saving of $7000 per year was effected by the change.

Another railroad reports that at one important yard where store delivery was inaugurated for approximately 245 car repairers it resulted in a saving of $40,000 per year. This was based on a check of the men actually coming for material of the different ratings, whether mechanics, helpers or laborers, for a period of 10 days as follows:

Trips Made	By Mechanics	By Helpers	By Laborers
1st day	87 1235 min.	80 1135 min.	36 674 min.
2nd day	401 3688 min.	310 3568 min.	30 435 min.
3rd day	218 1356 min.	227 2674 min.	28 589 min.
Average time consumed in making trip 10.1 min.			
Work done	49.82%	43.5%	6.8%

The number of trips made for 10 days period was an average of 1528 per day or 15432 min. per trip which is the equivalent of 32 men.

On a percentage basis, this gives:

15 Mechanics	@ .67 per hr.	$ 80.40	per day
14 Helpers	@ .49 per hr.	54.88	per day
3 Laborers	@ .35 per hr.	8.40	per day
Total		$143.68	

With 12 per cent of the trips made consisting of trips going to the car shops for bolts or getting material drilled, etc. This could be largely eliminated if stock could be provided sufficiently in advance, the cost of delivery by stores department forces on this basis would be:

1 Foreman	@ .55 per hr.	$ 4.40	per day
5 Helpers	@ .42 per hr.	16.80	per day
14 Laborers	@ .37 per hr.	41.44	per day
Total		$ 62.64	
Saving per day		$81.04	

When the check was taken there were 168 men on the repair track. When the plan was put into effect they had added 75, making a total of 243 men. Decreasing their cost on the same proportion would mean it is costing them $205.00 per day.

It was arranged to do this with force as follows: two foremen, one truck operator, five deliverymen, 14 delivery helpers, at a cost of $72.92 per day, or a saving of $132.08 per day as compared with the mechanical department cost. Figuring on 305 working days in the year would make a saving of $40,284.40 per year. It would really be more than this rather than less because it was impossible to observe every man who went after material. Also, as soon as the men learned they were being checked they speeded up.

Another railroad which inaugurated deliveries of materials to shop and car repair forces at various points reports a saving of $50,000 per year as compared with the old method.

Another railroad making this installation at one large shop reports a saving of $22,000 per year as compared with the old method.

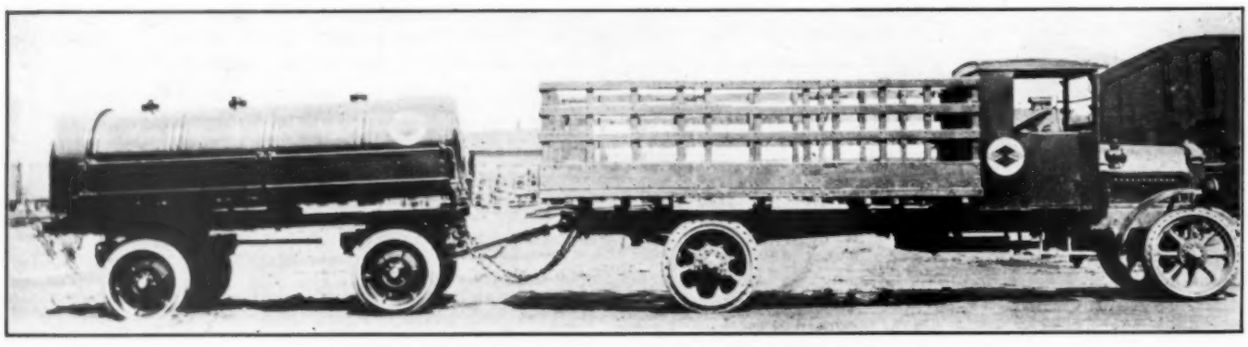
Stores delivery seems to be generally accepted as the most economical method for supplying workmen with the necessary materials and supplies, and the committee recommends that any railroads on which it is not in practice, start a thorough investigation to determine what it is now costing them to supply the necessary materials to each locomotive department mechanic and car department repair man on the job per day or man hour of service of that man, and determine if a considerable saving could not be made by properly organized stores delivery.

It is also recommended that further study be made of delivery by messenger at roundhouses and small car repair yards.

Deliveries

One railroad makes schedule delivery of shop oils and waste through its roundhouses and main shop buildings. It uses a four-wheel trailer with two racks on the back end that will hold two 55-gallon drums for distillate used at roundhouse, boiler shop, machine shop, blacksmith shop, steel car shed and freight shed. Just back of the barrel racks there is an open space 40 in. by 40 in. with 6-in. side boards to carry small quantities of oils in cans. The remainder of the trailer is taken up by a waste rack 48 in. by 48 in. with flat sides 30 in. high. In this is placed waste put up in ½-lb., 1-lb., and 2-lb. bundles by the night oilhouse force.

Two trips are made daily and the shop forces are familiar with the schedule so that they draw oils and waste accordingly. This



Oil Delivery Equipment on the Illinois Central

offsets 12 to 16 trips previously made daily by tractor and trailers from the oilhouse, which in this instance is some distance from the storehouse or other seats of distribution from which miscellaneous material is constantly moving by schedule trailers.

It is found that a number of railroads having some shop delivery are not delivering ice to the containers about the different shops and storehouses by the same method. An investigation will reveal that almost universally where delivery of miscellaneous materials is handled by stores forces the delivery to and placing of ice in the containers about the different shops and store yards and buildings can be made with a considerable saving as compared to the method in use.

Request for material

While the practice of delivery only on properly approved requisitions seems most generally in use, it is recommended that further study be given to the acceptance of requests from the mechanics, orally or by telephone, for repair parts which are useful on the work in hand.

Cooperation of the users of the material should also be constantly urged toward advance anticipating and requisitioning even to the stipulation of the time and date on which delivery is desired where requisitions are submitted several days in advance. This permits the dispatcher to plan his work ahead and assists toward greater economy in the operation of this method.

Where telephones are convenient to each foreman and each stockman it shortens the time of settling questions of needs, substitutes, or improper materials, and tends generally to create harmony and eliminate criticism, both of which are very frequently due primarily to misunderstanding. The placing of sufficient telephones for convenience of the foremen or other authorized employes in securing of materials would generally prove economical.

Equipment

There are now on the market several types and sizes of tractors and trailers for use in this work.

There are trailers made specially for the handling of lumber.

There are dump trailers for use in handling rubbish gathered in cleaning about car repair yards and similar places. These are recommended where there is sufficient volume of work to keep them constantly busy.

For the handling of mounted cast iron wheels there is not a commercially manufactured trailer that can be coupled in with other miscellaneous trailers handling stores delivery. Some have used wheel wagons or carriers of the overhead type but they have not proven generally satisfactory for coupling along with others. One railroad has recently developed a small trailer for the carrying of one pair of wheels. It is planned so that two men can easily roll the wheels onto the trailer.

For general purposes, trailers having steel beds are recommended as against wood bed trailers. The former can be used for placing of hot forgings or other hot material in them direct from machines, saving extra handling.

It costs not to exceed $20.00 per year for interest, depreciation and maintenance on the average trailer. In any shop delivery or material transfer scheme there should be sufficient trailers so that materials taken from a machine or other location which are to go to another will be placed directly on a trailer and not removed until taken off at final destination for that yard.

The largest factor of saving in connection with handling of material by trailer is the elimination of lifts more than the cost of the transfer of the load from one location to another after it is located on the vehicle. For general shop and car repair yards, etc., there should not be less than 25 and from that up to 50 trailers per tractor, as conditions warrant.

Investigation reveals a tendency to accept trailers that are too light for the service required. This results in delays to operation, lack of confidence in the equipment, excessive cost of maintenance and frequently in failure. A trailer having not less than a 2-in. steel axle is generally desirable.

There is a tendency also to overload this equipment. A trailer is set in the shop or some other location for loading by an employee who does not realize the weight limit and puts on the full volume capacity regardless of the weight, damaging the equipment so that it must be repaired, or if not detected and repaired continues in service with excess friction resistance and wear.

Investigations indicate that concrete roadways and rubber tired trailers are sufficiently economical as compared with dirt roads and steel tired trailers over a long period justify the added installation expense.

On one railroad, trailers are placed at convenient locations to accumulate scrap materials and rubbish throughout the day. At night store delivery forces organized for that period move these trailers to the proper locations and replace them with empties for the following day. The same forces also deliver heavy materials to back shops during the night. It can be done with less interference and greater safety to shop employees.

Delivery cost

At present there is no basis of equitably comparing the cost of delivery of material to shops on one railroad with the cost on another railroad. With a view of securing figures that might be useful, it is recommended that each road compile data as to shop delivery costs on the basis of the cost for delivering each item on a requisition. One item should constitute a delivery when finally and completely delivered even though more than one trip is necessary to accomplish it.

In arriving at costs for comparison, the following should be included:

The direct charges for operation including repairs to equipment; charges for supervision; interest on investment; depreciation, except in individual cases where investigation shows some other figure to be correct, 20 per cent is considered proper for power units and 10 per cent for trailers; insurance; taxes.

For comparison of costs of shop delivery at one point as compared with another point on the same railroad, it is recommended that the cost per delivery per car man hour or locomotive man hour be determined. In arriving at these costs there should be excluded all inspectors and service employes such as mill men and general workmen who are not actually and directly working on the unit that is used for the basis of comparison.

Committee: H. C. Stevens, general storekeeper (Wab.), chairman; D. Corcoran, general storekeeper (C. & N. W.); H. R. Duncan, inspector of stores (C., B. & Q.); J. S. Gabriel, division storekeeper (D. & R. G. W.); G. H. Greer, assistant to purchasing agent (M. & O.); C. W. Kinnear, assistant general storekeeper (Penn.); G. P. Turner, division storekeeper (Sou.); W. J. Sidney, division storekeeper (L. V.); and J. G. Stuart, general storekeeper (C. & Q.), chairman ex-officio.

The discussion of the committee's report follows the abstract of the supplementary paper on this subject by G. W. Gerber.

Stores Delivery of Material

By J. W. Gerber

General Storekeeper, Southern

The word "Savings," as we all know, has a potent meaning in railroad management and no matter how able our arguments may be when seeking changes in existing conditions, the final paragraph, showing the "Savings" that can be effected, either in operating costs, or increased efficiency, is the controlling factor.

In considering the question of stores delivery I believe that we can gain some valuable information by the study of the figures of the committee showing the comparative cost of the delivery of material to a car repair yard when done by the using, department and the cost of the work as performed by the stores department.

The report shows that at a car repair yard employing 168 men, it required the services of 15 mechanics, 14 helpers and 3 laborers to supply the material required for repairs, or in a total force of 168 men, 32 men were giving their time to the procuring of material. I do not think we should too hastily say that this was an unusual condition. We should rather accept the statement as a challenge to investigate the conditions on our own lines.

The division of the time of the 32 men procuring material was approximately as follows:

Mechanics	50 per cent
Helpers	43 per cent
Laborers	7 per cent

The daily labor cost of the 32 men procuring material is given as $143.68. To determine what proportion this cost bears to the total daily payroll we will assume that all of the 136 men were mechanics, employed at the rate of 67 cents per hour, or a total for the men actually engaged in applying material of $728.96, and a total for the force of 168 men of $872.64.

Let us now examine the cost of delivery of material to the

same car repair yard by a separately organized force. We find the force consisting of one foreman, five helpers and 14 laborers, at a daily cost of $62.64. Quite properly a foreman is placed in charge of the force.

Assuming now that the entire daily payroll of $872.64 is expended in applying material, with the exception of $62.64 per day, for the delivery force, we find that the cost of delivery has been reduced from 16 per cent to a little more than 7 per cent of the total payroll. You will note that the saving of $81.04 per day is equal to the daily wages of 15 mechanics. The saving of $25,000 per year in the payroll of a car repair yard employing 168 men, is worthy of our study and consideration, and this regardless of the department in which the credit for the saving may lie.

In the report the statement is made that 12 per cent of the trips made were trips going to the car shops for bolts or getting material drilled, etc., and if stock could be provided sufficiently in advance, these trips could be eliminated to a large extent. I would assume that when the delivery work was taken over by the stores department, that steps were taken to make the initial unloading of car material as closely as possible to the point where it was to be used, and that an adequate stock of material was maintained. Of course, this should have been done without regard to the department making the delivery of material to the repair tracks. But it sometimes requires radical changes from existing conditions to bring about improvements which when once accomplished are readily recognized by all.

Storage of material is closely associated with economy in delivery of material and is a factor, often overlooked in providing storage facilities. I quote the following from a recent article by the world's greatest automobile manufacturer in connection with the handling of material at assembly plants:

"In the Chicago plant the greatest distance any material has to be trucked is 20 ft., this being the distance from the incoming freight car to the first conveyor. After this it is mechanically handled during the entire process of assembling the units into a finished car."

Lack of supervision of the car department force procuring material, was no doubt, largely responsible for the excessive cost of handling, and it is well to note that the organizatiin of the stores delivery force begins with a foreman.

As aids to reducing the cost of handling material at car repair yards, I would suggest that the daily requirements of material in kind and quantity be determined as far in advance as possible, that close supervision be given to the forces employed and the storage of the material made as closely to the point where it is to be used as practical.

Discussion

The following discussion includes the discussion of the remarks of Mr. Gerber and also the committees report on this subject:

D. H. Reed (Sou.): I have information showing the actual cost of delivery of materials at an exclusive freight and passenger train car repair shop.

Before attempting to obtain any figures on delivery cost we first made a thorough study of the physical layout including facilities for handling material, distances from the point of issue to the point of use. We prepared a drawing of the ground plan of this plant and traced in red lines the number of feet traversed by employees of each department in making trips to and from the store-house, material platforms and other points of the plant for materials. The delivery of material at this plant is done entirely by the mechanical forces. In order to obtain impartial information reflecting the actual cost of material delivery under normal conditions no advance information was furnished to the mechanical forces regarding this check. For a two-day period checkers were stationed throughout the plant and a complete record was obtained of the number of trips by employees of different ratings and the time consumed in obtaining and delivering all material and supplies during this period. Although this information was gathered from all departments we are giving for the purpose of this report figures obtained affecting freight car repairs only.

Following is a table showing the cost of delivering material consumed in freight car repairs for one day by mechanical forces:

Class	Trips	Minutes	Rate per Hour Cents	Cost
Mechanics	427	3416	67	$38.19
Helpers	328	2624	50	$21.88
Apprentices	57	456	40	$ 3.00
Laborers	29	232	27	$ 1.08
	841	6728		$64.15

The freight car employees numbered 217 men at a daily wage of $1,069.76. The daily cost of delivering material was approximately six per cent of the pay roll cost.

The average time consumed per trip was eight minutes, and the force employed making the trips was equivalent to 14 men and approximately six per cent of the car force employed as shown by following table:

	Employed	Delivering Material per cent
Mechanics	173	7.1
Apprentices	17	.94
Helpers	12	5.47
Laborers	15	.50
	217	14.012

We feel a hesitancy in saying that we could lower the present cost of delivering material by the mechanical department at this point. Given additional facilities such as tractors, trailers, etc., there is no doubt that the cost of delivering material could substantially be reduced by either the mechanical or stores department. If the stores department should take over the delivery of material at the present time we feel the labor cost by the stores department would be practically the same as that of the mechanical department. The only difference being that it would reflect in the output of repaired equipment, as the force now employed in delivering material would be used exclusively in repairing equipment and prevent excuses on the part of mechanical department men being away from their work.

J. G. Stuart (C. B. & Q): Material should be placed as near to the user as possible. But when you repair a foreign car it is often necessary to take a piece of lumber to the mill and have it made just for that car. You can not keep that in stock

Mr. Reed: We gave no advance notice or any preparation. Of course, after starting, we realized the men soon commenced wondering what we were doing, and it was not long before they were doing better, and that helped us on the time.

Mr. Stuart: You might just as well have given them advance information. We told the foreman we were going to do it, so there was no chance for their disagreeing afterwards. We even went so far as to have the car foreman sign the statement with us that it was correct. When you go out on the repair track or any other place and start something new, the men learn about it almost instantly, and they speed up.

Instead of running the test for two days, we kept it up for a 10-day period. The enthusiasm of the carmen lessened at the end of three or four days, and then we commenced to get a record under normal conditions. Two days is too short a period. Ten days is better, and 20 days would be better still.

A storeman will carry more than a mechanical man when he is carrying material. But there is the difference that when the mechanical department man goes after material, he invariably goes after what he wants. When the men carry out material, it is just as easy to carry it back. When a mechanical department man carries material back from the repair track, if he does, he usually throws it down in a pile, and then someone else is paid to sort it out. When a storeman carries back material he puts it where it belongs. A mechanical department man is primarily interested in repairing cars. A storeman is priarily interested in handling material. He has not the same incentive to stop and talk. The foreman is following him more closely because the foreman has nothing else to do.

The car foreman on the other hand has a great deal to do. In fact, material is a side issue with him. He is, first of all, interested in getting his car repaired correctly, and so the men have very little supervision when they are going after material. Furthermore, a storeman is decidedly interested in reducing the cost of handling material.

On our road, we not only know how many trips the men make, but we keep regular reports afterwards to show how many trips a storeman must make to deliver material to a certain gang or a certain car on the repairing track. We know how much it costs per day for the storehouse to deliver material per man using material. When we get that report in and see that on one repair track we are able to deliver material in four trips where in another it takes 14 trips per car, we investigate. When the cost is 15 cents a day to supply a carman on one track and 45 cents on another track, we know there is something wrong.

Mr. Reed: I agree to a large extent with Mr. Stuart. We all realize it is a universal practice at shops to have a certain amount of loafing on the job. When we started the check, we realized that as soon as the men knew that an investigation was being made they would no doubt speed up. Therefore, we provided for that, and the figures that I quoted take care of any laxity on that point. I feel that if we had made the check for a period of 20 or 30 days, these figures at this plant would still support the statement I gave.

Chairman Stevens: The committee found at one large car yard, that a record had been made at first of the number of mechanics, number of helpers and number of laborers that called at the different store stations during a certain period for materials. The investigators were able to get that information quietly without arousing questions. A little later, a complete 10-day check was made to determine the percentage of each class of mechanics that called for material during the average 10-day period as compared with the percentage obtained when the record was made of just the class that showed up for the material. After the third day of the 10-day check, only 30 per cent as many mechanics came for material as during the preliminary period.

W. F. Jones (N. Y. C.): A saving of $40,000 a year at a point where 245 car repairers are employed challenges the advocates of the generally prevailing practice of cash and carry. From this saving of $40,000 per year, I have figured conservatively a cost of $62,500 per year or 84 cents per man per day under the practice of material delivery by shop forces. Under stores delivery, this was reduced to 30 cents per man per day, according to the report of the committee. That appears to be an unusual case and cannot reflect the average condition which prevails on many railroads.

I will cite a case on the New York Central where, if the figures were taken without comparison, it would warrant the discontinuance of delivery by stores forces. A total of 496 men employed on steel cars were served by nine car department laborers and one leader, at a cost of approximately six cents per man per day. This figure does not include the cost of handling wheels to and from repair tracks. This small expense is in keeping with our established policy of locating our stores close to the point of operation.

At one of our large car repair shops, we have within the shop building a large space devoted to stores. Shopmen call for the material, take it away, and the storemen replenish from general stock, either by truck or by car. The cost of delivery is reduced to a minimum. Shop laborers, when making delivery or when going for the material, lose no time, as their earnings are based on a percentage according to the amounts earned by the car repairers who are paid on a piece-work basis.

Chairman Stevens: Does this low cost include the cost of carrying the added sub-stock and the cost of maintaining the structures and all costs in connection with that added stock?

Mr. Jones: At this particular place, it is not a sub-stock but the general stock. It consists of brake staffs, brake wheels, journal bearings, steel pressings, and miscellaneous material of that character that goes into the repair of steel cars.

Mr. Stuart: The place where a general repair track is being operated is entirely different from the place where you are rebuilding cars.

Mr. Jones: We know that it is farther from a central distributing point to the extreme end of the track than to a car located right close to the supply depot. Therefore, in order to deliver this material to those extreme places and along those tracks, it is done by shop forces. In this particular shop, the man that looks after the material is an old storekeeper. He has organized those forcs, and is making delivery at as little cost as we would in the store department.

Relative to small repair points, at one repair point in New York, we have most of our material located outside along the tracks. Men on the car department payroll at 40 cents an hour go and get that material from the piles, under the jurisdiction of the storekeeper, and deliver it to the men who are using it.

We have the same conditions, Mr. Stuart, as you have, and we are giving it thought. The actual cost of six cents per man per hour is not a test case but is actual.

Mr. Stuart: I understood you to say that this storekeeper was on the mechanical department payroll and was just as efficient as any one else. I am going to deny that a storekeeper under the mechanical department can be as efficient as the storekeeper under the store department.

W. F. Morehead (I. C.): In getting material to shop stores, I assume that due consideration has been given to the cost of getting this material from the car in the first place. It costs you money to put material in your shop store, whether you do it at the time that it is required or whether you do it at the time the material is unloaded.

E. H. Nicodemus (Penn.): While we don't have store delivery, nevertheless in some of our large engine houses, which turn about 150 locomotives a day, we have what we call small working stocks. We do not put everything in that working stock, but we do carry bolts, nuts, washers, etc. Deliveries are made every morning from these working stocks. Our master mechanics and engine house foremen are pleased with the system because it keeps the men on the job.

O. A. Donagan (B. & M.): One of the biggest problems in this shop delivery system is to determine where to leave off. So many lines of service are incidental to shop delivery that they will bear investigating. About two years ago, at our general storehouse, we took over the shear gang, and now deliver bar iron and steel, and also spring steel for the manufacture of locomotive springs direct to the shop, cut to size. This has not only proved economical, but it has also meant that we have received full use of all iron and steel.

C. C. Kyle (H. P.): I am rather surprised at the apparent opposition to the stores delivery of material.

We put the stores delivery in some years ago in opposition to the mechanical department, and today there is no shop superintendent or master mechanic but will subscribe to the stores delivery.

We are making deliveries for about 50,000 orders per month. We are doing this work at a cost of about 5½ cents per delivery, which saves the railroad at least $65,000 a year.

Control of Line Stocks

L. C. Thompson
Chairman

It is axiomatic in railway management that the best way to control material is through concentration at prescribed points where permanent facilities and organizations can be provided for its care and supervision. When this is not feasible the problems become those of determining the best method of control under the circumstances. In this class fall line stocks, comprising widely scattered and fluctuating accumulations of rail, ties and other materials with shifting points of use. With the large expenditures for this material and the effect of efficient or inefficient control upon other stock, accounts, etc., Division VI has repeatedly held line stocks up as an important field of inquiry. In its report this year the committee endeavors to dispel the confusion as to what specifically line stocks are and exactly what they should include. The recommendation that such material should be carried in the stock balance of the stores department and a description of various practices for controlling such stock are also contained in the report.

Your committee has concluded that this report should be divided into two sections, i. e.:—

(A) A comprehensive definition of Line Stocks.
(B) Recommendations and General Information.

Definition

"Line Stocks" should consist of the materials specified below when such materials are distributed as described.

(1) Materials included in Classes 1A to 9C of the Standard Material Classification, used for maintenance of way and structures and for additions and betterments.

(2) Materials included in Class 11, 14, 15, 16, 25, 42, 45, 46, 47, etc., used for maintenance of way and structures and for additions and betterments on which the subsequent maintenance will be chargeable to maintenance of way and structures.

(3) The materials described in paragraphs (1) and (2) in order to classify as "line stock" shall be distributed to and be on hand unapplied at the approximate point of use, i. e., right of way, track section, bridge, building, miscellaneous structures, etc.

(4) Such materials if carried in storehouses and material yards are not to be considered line stocks regardless of whether the values of such stocks are carried in the material balance of the store department or in a special material balance carried by another department.

(5) Line Stocks will ordinary be used at the point where such materials became line stock as described in the foregoing. However emergencies may arise where such materials are more urgently needed at some other location, certain projects may be curtailed or abandoned and certain materials may be left over after a project is completed and these contingencies will necessitate such materials being used elsewhere.

_____ R. R.

STATEMENT OF MATERIALS & SUPPLIES—MONTH OF_____ 1926

	Regions	Value on hand	Received during month	Total Value	Issued during month	On hand Dec. 31, 1925	Percentage of Issue to Total	On Hand Dec. 31, 1924
Stores Stock	1 2 3 4 5							
Ties	1 2 3 4 5							
Rails	1 2 3 4 5							
Scrap Stocks	1 2 3 4 5							
Fuel	1 2 3 4 5							
Miscellaneous	1 2 3 4 5							
GRAND TOTAL								

Exhibit A—A Form Used on Some Roads for Reporting Line Stock

Recommendations

(1) It is recognized that, in the up-keep of a railroad, accumulations of materials termed line stocks herein exist and must continue to exist.

Various methods of control as outlined hereinafter are practiced and such methods should be perfected and continued in force. It is felt, however, that material paid for by a project anticipating rather than actually receiving the benefit thereof is stripped of the title "stock" and once outside that category the store department, at least, surrenders its grip on it.

On special materials provided and suitable for an individual project, charging to the project before actual use cannot be objected to but, on the other hand, to carry such items as stock until actually applied, the same as interchangeable materials, will work no hardship and in many cases plans are altered to an extent that the use of even special materials is abandoned.

Aside from the foregoing conditions which are mentioned to point out the advisability of carrying these materials in stock until actually applied, "Account 716—Material and Supplies" stipulates "this account shall include balances representing the cost, less depreciation, if any, of all unapplied material," and the recommendation of your committee is that this instruction be observed.

(2) The value of line stock materials shall be carried in the stock balance of the store department, which balance in many instances is only part of the Account 716 balance.

(3) Efficient mediums of control are supply train or supply car delivery and inspection, periodical checks, and on some roads line checkers are employed continuously for this specific purpose. Others control through lists authorizing specific quantities.

(4) Control should be maintained through inventories and periodical checks made from time to time. With these records and checks, material can be located where used and not reported, or where inactive or excessive may be transferred. Using departments can assist materially in the control of line stocks by specifying on requisitions, the date when materials should arrive.

(5) The committee has found the following practices in effect:

(A) A number of roads are carrying as emergency or protective stock secondhand material instead of new, such as frogs, crossings, etc.

(B) Some railroads are using what are termed authorized lists, by which they control the maximum stock carried by the various sections or districts, etc., confining the quantities of material replenished to the quantities reported consumed.

(C) Some roads are compiling statements such as Exhibit A which draw to the attention of the supervisory officer at a glance, an increase or decrease in the various stocks which can be investigated for detailed information.

(D) A number of roads are using a color scheme in marking material; red being used for scrap, yellow for repaired material and white for good secondhand material. This is of particular value to inspectors or others in checking and compiling their report.

(E) Many roads are taking full advantage of local storekeepers at terminals and other locations where line stocks are being carried, by putting these stocks under his direct jurisdiction. This serves in many cases to reduce line stocks materially by consolidation and better control, thereby reducing the investment.

(F) Some roads, where practicable, are dating materials when shipped to the line by means of tags or painting the requisition reference and date shipped on material, this to enable inspectors or others to bring inactive stocks to the attention of the users of material.

Your committee is of the opinion that the majority of roads are alive to the subject of line stocks and great progress is being made in this respect by obtaining the cooperation of officers responsible for the use of the materials, thus reducing the investment and assuring prompt turnover.

Committee: L. C. Thomson, manager of stores (C. N.), chairman; H. Hayes, general storekeeper (G. N.); J. C. Kirk, assistant general storekeeper (C., R. I. & P.); J. L. Layton, assistant chief material supervisor (Penn.); F. McGrath, traveling storekeeper (B. & M.); J. E. Peery, traveling storekeeper (S. P.); E. A. Porter, district storekeeper (M. P.), and W. Davidson, general storekeeper (I. C.), chairman ex-officio.

The committee's report on stores delivery was adopted as read.

Discussion

C. E. Barba (B. & M.): Why is a distinction made between unapplied material at the approximate point of use, material carried in the storehouses, and material in yards. I believe that material carried in small storehouses, under the jurisdiction of the maintenance of way department or bridge and building crews, and the material stored in small yards under the jurisdiction of track supervisors, should be considered line stocks.

Chairman Thomson: It is the thought of this committee that there should be no material under the jurisdiction of the building and bridge or other departments. All materials should be under the jurisdiction of the stores department. Materials, as outlined in the report, would only become material for maintenance of way use when they have been shipped to the line, consigned to some particular job, unapplied.

John Reinehr (C. M. & St. P.): We all have line stocks, emergency stocks, that are carried for protection of bridges, tracks, etc., consisting of lumber, rails, switch materials, and similar units. On our road such material is carried in the storekeeper's stock until used. I find that in a great many cases there is an excessive quantity of this material on the line. The maintenance officers have given no consideration to the value and the cost of carrying that material in stock. For instance, many maintenance officers, regardless of the service that a railroad crossing is giving, immediately apply for a new crossing as a means of protection, as soon as one is installed.

Another cause for the accumulation of excessive line stock is having a definite maintenance program for a period of time. There is a tentative program, supposed to be definite, made up by the operating officers. The material is provided, rails, ties, castings, or whatever it may be. But as time goes on, earnings may decrease. The material is contracted for and accumulated, but the work is not completed. As a result there is a large portion of maintenance material which lies for months on the line, in storekeeper's stock. When this material is at the storehouse or at some concentration point, the consuming departments know it is there, but if it is out on the line it is difficult to get it to the point where needed. My recommendation would be to impress upon the operating and executive officers, the need of making a definite program for a season's maintenance work. It should be definite and should be carried out. I believe that it is feasible to extend the program as you go along. In the case of a 60,000 ton rail program, for example, I believe a definite program could be made for 40,000 tons, with 20,000 tons to be tentative. As the season goes along and the earnings of the road improve it is possible that the whole amount may be applied. Later deliveries could be specified.

R. A. Dickerhoof (Penna.): We all recognize that the control of line stock is a big question with respect to the material balance as a whole, and in control of line stocks. We will not only keep the material balance within reason, but also if the line stocks are kept up and well organized, the maintenance departments will have the material required to meet all situations and take care of all repair programs.

There being no further discussion the report was adopted as read.

Line Delivery of Material

C. L. Wright
Chairman

Supply train operation and line delivery of material have been the subjects of committee studies for so many years that it is becoming increasingly difficult for successive committees to avoid repetition in subject matter. It is interesting, however, that in preparing its report this year the committee, which comprises 10 members, of which three are members of last year's committee, observed the operation of supply trains on no less than 21 railroads. As a result of these visits the committee's efforts have been chiefly to the end of making such recommendations as will promote uniformity in practice. In addition, it describes the successful operation of supply trains in a congested terminal district which is a distinct contribution to the information on this subject in view of the continuing controversy over the practicability of supply trains under such conditions.

With the view of bringing about more uniformity of operating practices and developing the most up-to-date and economical methods of line delivery, the members of this committee personally visited and witnessed the operation of supply trains on 21 representative railroads. The result of these observations developed a wide variation in the practices in effect, not only in the methods of handling, but also the classes of material delivered.

After careful consideration and investigation, the committee finds that the following list of materials may be economically delivered by supply trains:

Station-tools and supplies (including baggage and other station trucks).
Section tools and supplies (including hand cars and push cars).
Other track material, such as angle bars, bolts, spikes, tie plates, etc.
Oils.
Gasoline.
Posts, wire, and other fence material.
Frogs, switches, guard rails and fittings.
Signal and interlocking materials.
Water treating plant supplies (including soda ash, lime and chemicals).
Pump house supplies.
Stationery.
Cement (small quantities only).
Grain doors and coopering material (small quantities only).
Materials and supplies for small car inspection points.

Delivery of switch ties, concrete and other heavy pipe, also small quantities of rail and lumber, is being successfully followed on several railroads, but it is not a general practice.

Operating in congested territories

Many supply department officers have held the opinion that supply trains cannot be successfully operated in congested traffic territories. This feature was investigated by your committee and as information to the members, we are giving the following report received from a railroad which successfully operates a supply train on a 60-day basis in what is probably the most congested traffic territory in the United States:

This railroad operates through the most heavily populated region in the United States. It is mainly an industrial section and the railway system which serves it is the result of some 80 years of development, which included several mergers. As a result, the road in its efforts to provide adequate service to all parts of its district operates a great many branch lines and the region affected is literally a net-work of tracks. For this reason, this railroad has been justly described as a huge terminal in itself and if this idea is borne in mind, a better understanding of the situation will be had.

The supply train on this road encounters difficulties of congestion other than at terminal points. For instance, on one busy division some 180 passenger trains and 70 freight trains are operated daily. A four-track system being used here, the usual procedure is to assign the supply train to track 2, when traveling

east, leaving track 4 for all locals. Express and freight trains running on track 2 can easily be run around the supply train by means of the high-speed cross-overs located about six miles apart, thus eliminating any possibility of delay.

Close cooperation between Stores Department and Operating Department is necessary to get the desired results, for with traffic concentrated, it is necessary to run the train on a track against the current of traffic for a short stretch. Often the succompletion of the day's movements will depend on such a move.

Likewise, this railroad successfully operates its supply train in its large terminal points. More than 500 passenger trains are handled daily in this terminal. Most of this traffic moves between the hours of 7 to 9 A.M. and 4 to 7 P.M. Through an understanding with the train dispatching officials, the supply train is permitted to operate on the main line from about 9 A.M. to 3:45 P.M., and in this way all tower, station, freight house, yardmaster's and lampmen's supplies are delivered, including stationery and oils. One of the towers thus handled is a mechanical tower of 172 levers making more than 1,100 movements a day. All supplies are left here, as at smaller towers, including 600 gals. of oil drawn from the supply train's tank cars and placed in the tower's storage tanks.

When any work is to be done in a congested yard, the supply train is usually placed on a track where no lead track will be blocked for any length of time, and little difficulty is thus met.

The supply train under discussion covers its entire system of 2,400 miles every 60 days, delivering material to all stations, freight houses, towers, yardmasters, lampmen, sections, etc. To the sections all track tools, spikes and bolts are delivered, but angle bars, tie plates, frogs, or switches are not handled.

The experience of this railroad clearly demonstrates the practicability of operation under congested traffic conditions.

Picking up scrap

Practically all railroads follow the practice of picking up scrap by supply trains. However, it was found that some railroads run scrap cars over the line, independent of their supply train movement. The committee feels that the picking up of scrap is an essential part of the supply train operation.

The Interior of Supply Car for Stationery

The committee recommends the use of a gasoline operated crane for the loading of scrap and the handling of heavy materials such as frogs and switches. The lower operating cost makes the gasoline crane preferable to the steam crane. Several railroads have added gasoline cranes to their supply train equipment during the past year.

Very few railroads are following the policy of delivering stationery from supply trains. Railroads handling stationery by supply train report a substantial reduction in their stationery expense.

In previous years the committees have consistently recommended 30-day delivery of materials by supply trains. A canvass of

A Supply Train on the Boston & Albany

various railroads develops that some railroads are operating supply trains and supply cars every 30 days throughout the year. Other railroads, operating on a 30-day basis, run the trains only nine or ten months out of the year. A number of railroads report that they are successfully and economically operating on a 30-day basis.

Your committee feels that this is a matter which should be decided by the individual railroads dependent upon conditions existing on their properties.

Committee: C. L. Wright, general storekeeper (M.-K.-T.), chairman; A. W. Blume, general storekeeper (St. L.-S. F.); A. C. Johnson, division storekeeper (N. P.); E. H. Lyons, division storekeeper (C., M. & St. P.); C. H. McGill, supply train storekeeper (N. Y., N. H. & H.); J. E. Mahaney, superintendent stores (C. & O.); F. J. Talbot, superintendent stores (Erie); J. D. Murphy, supply train storekeeper (N. Y. C.); J. W. Zimmerman, division storekeeper (Wab.); and A. S. McKelligon, general storekeeper (S. P.), chairman ex-officio.

Discussion

U. K. Hall (U. P.): On main lines where the delivery of material is heavy, there is no question but what 30-day delivery is perferable. On less important lines where the materials being used are not as heavy, possibly 60 or 70-day delivery would suffice.

Chairman Wright: We all know that it costs about one dollar to a dollar and a half per mile to operate supply trains, and we know that we should deliver as often as necessary. For years, we operated on a 30-day basis. We finally decided on a 60-day basis. We have not increased our line stock. Our service is just as good, and we have cut our operating costs 50 per cent. I find in our investigation that more railroads every year are adopting the 60-day basis, but I haven't found one yet that has returned to the 30-day basis.

C. C. Kyle, (N. P.): Our experience on the Northern Pacific with the supply train has been this: It was installed several years ago on the 30-day basis. We operated on a 30-day basis with many interruptions, finally adopting, the 60-day schedule, and we find that it has not increased our investment to any great extent on the line, and we believe that a 60-day schedule is best.

A. S. McKelligon, (S. P.): It is my opinion that on the main line where you use any amount of material, the 30-day schedule is the proper one. We saved just $110 a month per division. We have got to balance that against the service that is given, and just as soon as you go from 30 to 60 days, which I believe has generally been forced on the stores department by the operating department, you increase the stock and investment, and lose the supervision needed. It is simply the difference between doing the work right and not doing it. Thirty day service for a heavy traffic line gets the best results.

The report of the committee was adopted as read.

Report of Joint Committee on Fuel

Samuel Porcher
Chairman

The joint committee on Fuel Conservation is not a committee alone of purchasing and stores officers, but also comprises mechanical officers, representing Division V—Mechanical, A. R. A., and traffic officers, representing Division III, A. R. A. This committee was created several years ago at the instigation of the board of directors of the American Railway Association for the purpose of divising ways and means of co-ordinated effort toward the conservation of fuel on railroads. The purchasing and stores representatives of this joint committee have submitted reports of the work, for several years, the reports of the last three years, consisting of reports on progress for the information of the association rather than recommendations for final action.

While no meetings of the Joint Committee on Fuel Conservation have been held since the 1925 annual meeting of the Association a circular letter was prepared and issued to the railroads of the country in July, 1925, calling attention to features of general importance in connection with the conservation of fuel, and earnestly suggesting to railway executives their careful consideration of the establishment of some form of fuel organization on all roads where none exists, and the strengthening of present organizations for fuel consumption supervision.

Emphasis was laid on the possibilities for saving through reduction of operating expenses, since the general average cost of fuel consumed is about 11 per cent. of such expenses, and experience has shown that well-directed and sustained effort will accomplish a 5 per cent. saving in the fuel bill on many roads. Even the most cursory thought of the annual expenditure of $550,000,000 for fuel by our railroads indicates the tremendous possibilities.

The possible saving in fuel consumption through further improved and additional mechanicalization methods was also given thought and submitted to the Board of Directors. However, it was their feeling this should be handled through education of the members of the International Railway Fuel Association and the managements of roads represented therein by reports of committees or other recommendations from that body.

Reconsideration of the proposed "Definite Ratio for Equating Coal and Oil as Fuel in Consumption and Conservation Comparisons" by the Joint Committee on Fuel Conservation and a special committee of the International Railway Fuel Association resulted in a decision to submit the proposition to another letter-ballot, all feeling that the subject was of special importance. However, this second effort was no more fruitful than the first and the question remains in statu quo ante.

Committee, S. Porcher (vice-chairman) general purchasing agent, (Penn.); R. C. Vaugham, vice-president, (C. N.); S. B. Wight, assistant to president, (N. Y. C.); G. E. Scott, purchasing agent, (M. K. T.); H. B. Grimshaw, (S. A. L.); L N. Hopkins, general purchasing agent, (C., B. & Q.); Thomas Britt, general fuel agent, (C. P.).

The report was received without discussion.

Seasoning Considerations Acquire the Railroads to Carry Large Stock of Ties

New Devices

Edgewater Ring Spring Draft Gear

THE ring type of spring is made of solid rolled rings of alloy steel made up in pairs, consisting of an outer ring and an inner ring. Each outer ring has its interior surfaces tapered, and each inner ring has its outer surfaces with a corresponding taper. When an axial pressure is applied, the outer ring is stretched and the inner ring is compressed, and the friction between these tapered surfaces increases the load which the spring will carry and decreases the recoil of the spring. This produces a dampening action, the amount of which is controlled by the design. The elastic limit of the metal in these rings runs well over 180,000 lb., and the ultimate strength above 210,000 lb.

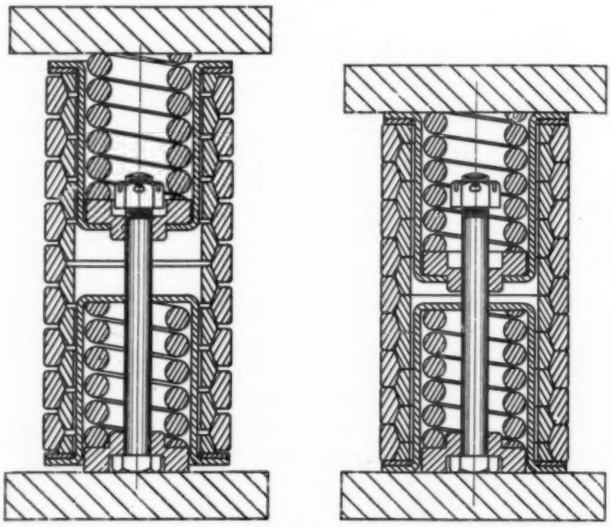
Draft Gear Ring Springs before Assembling

The action in each ring is either entirely tension or compression, and the cross section of each ring is loaded uniformly.

The Edgewater Steel Company, Pittsburgh, Pa., which has taken over the rights for the manufacture and sale of these devices under the various patents, is exhibiting draft gears using ring springs.

Another interesting feature about the spring, from a mechanical standpoint, is the low recoil, due to the absorption of work by the frictional surfaces. The spring has a recoil, depending on the design, of from 30 to 60 per cent. of the resistance it offers to compression. The weight of the spring element required to carry the load is only a fraction of that required with other types of springs, and recent tests show that the swaying and surging of high center of gravity cars and locomotive tenders has been materially reduced by their use.

On account of the limited space available and the desirability of not exceeding the present travel, designers have been unable to get as high capacity as was desired in draft gears, coupled with true spring action and sure release, and a uniform action from no load to maximum closing load. With the ring spring, however, the engineer can calculate closely the capacity he will obtain. It is easily possible, within the space requirements and without excessive weights, to design a draft gear of over 30,000 ft.-lb. capacity, and it is, of course, just as easy to design a gear for only 10,000 ft.-lb. capacity. A number of these gears of high capacity are now in service, and the manufacturers are prepared to furnish either moderate or high capacity gears, in either an open or closed design.



The Ring Spring Draft Gear Released (Left) and Compressed (Right)

Double Battery Change-Over Switch for Private Cars

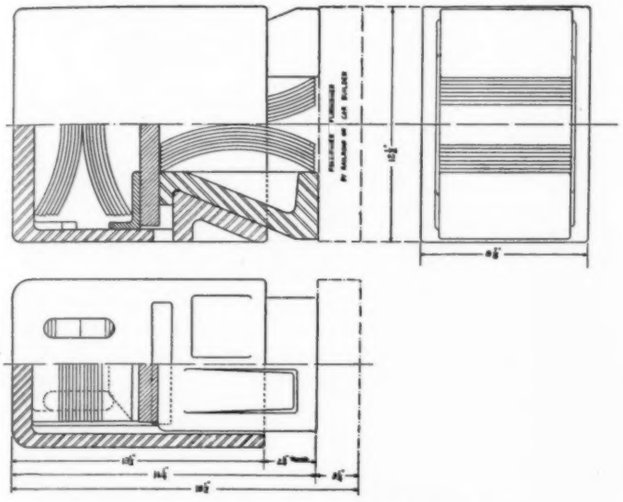
THE Safety Car Heating & Lighting Company has equipped a number of private cars with double battery equipments, using either a manual or an automatic change-over switch for interchanging the batteries. Various types of switchboards for this service are being exhibited at the company's bath.

The panels carrying the automatic change-over switch are equipped with a new modification which consists of a push button control for testing the change-over switch or to enable the interchange of batteries on the light circuit when the generator is not operating. The change-over switch is mounted on the switchboard panel which is also provided with terminals for train line connections and for connections for using 110-volt a.c. lighting service.

Waugh-Gould Friction Draft Gears

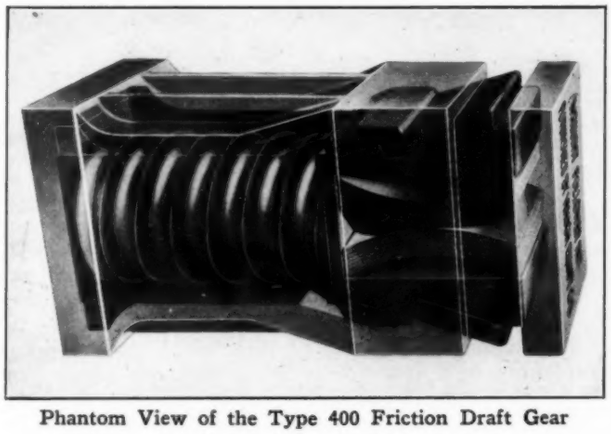
THE Waugh Equipment Company, 122 South Michigan avenue, Chicago, is exhibiting two types of draft gears, each of which has been designed for a specific purpose.

The Waugh-Gould Type 400 friction draft gear retains



Construction of the Type 425 Draft Gear

the same characteristics as former designs to which has been added greater capacity and sturdiness. As may be seen from the illustration, the gear consists of two wedges between which are placed two leaf springs, each containing eight leaves. This unit is held in place by two wedge shoes. The barrel contains a double coil spring, one end of which supports a follower plate. This arrangement



Phantom View of the Type 400 Friction Draft Gear

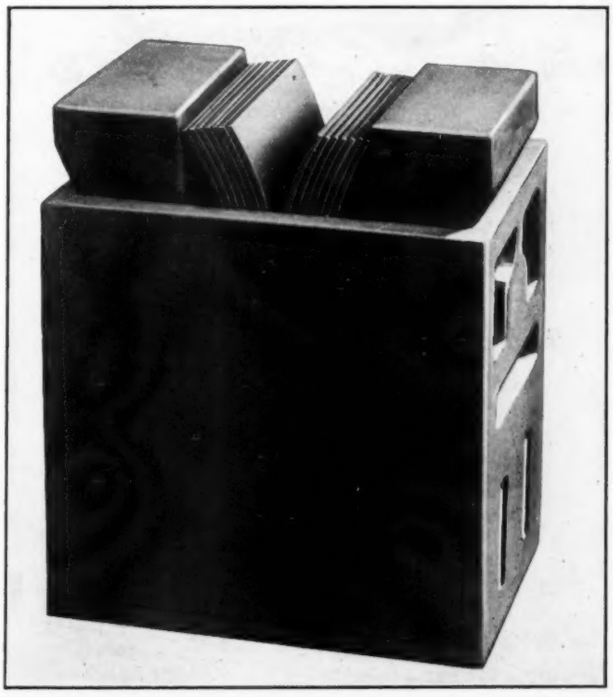
eliminates the wear of the casing which is restricted to the wedge shoes.

The following table shows the characteristics of this type of draft gear:

Drop Test—9,000 lb.	
Free fall to close gear	22 in.
Gear travel	2-23/32 in.
Total fall	24-23/32 in.
Recoil	15 per cent
Static Test	
Pressure developed to close gear	310,000 lb.
Car impact test (143,000 lb. cars, two gears)	
Closing speed	4.32 m.p.h.
Work done	47,000 ft. lb.
Work absorbed	43,340 ft. lb.

The Waugh-Gould Type 425 draft gear has been developed to provide cars equipped with 18½-in. draft lug spacing, the same draft gear protection as cars equipped with larger draft pockets. The gear consists of the barrel into which fits the two sets of seven leaf springs, two wedges, a follower plate and two release spring spacing angles.

Leaf springs are used for releasing the gear, instead of the ordinary coil spring, to give a large amount of absorption and eliminate the possibility of the gear sticking under compression. Ample provision is made against the possibility of overloading the springs, thus preventing their developing permanent set.



The Type 425 Gear is Designed for Cars Equipped with 18½-in. Draft Lug Spacing

The following specifications show the characteristics of the gear:

Drop hammer capacity, 9,000 lb.	24¾ in. total fall
Static capacity	350,000 lb.
Absorption	85 per cent
Weight per gear	317 lb.
Travel	2¾ in.
Size	16¼ in. by 12½ in. by 8⅞ in.

Flexible Metallic Steam Conduits

THE Vapor Car Heating Company, 80 East Jackson boulevard, Chicago, is exhibiting its flexible steam conduit for use between the engine and tender. It has a full 2-in. area throughout for steam passage, a minimum of angular turns, compensated for by increased area at the angles for the purpose of giving maximum steam delivery. The engine conduit is connected with a coupling or union to facilitate separation of the engine and tender.

The conduit is supported by case-hardened steel pins and bushings arranged to provide free swinging, rocking, swivel or rotary movement in train or yard switching service. This method of supporting the conduit is for the purpose of removing all weight from the ball surface

and from the gasket, permitting the conduit to be freely flexible. The gasket is held in place by a light tension spring which insures that it will follow up normal wear. The internal steam pressure serves to hold the gasket firmly against the ball member.

The flexible steam conduits in use between passenger cars are made in both 1½-in. and 2-in. sizes and are

Flexible Steam Conduit for Use Between the Engine and Tender

designed for application to A. R. A. standard end valve location. They can be used instead of rubber hose without changing either the present standard end valve or steam coupler equipment.

The flexible conduits as used between cars are furnished with special permanent chain and spring supports

Flexible Steam Conduit for Use Between Passenger Cars

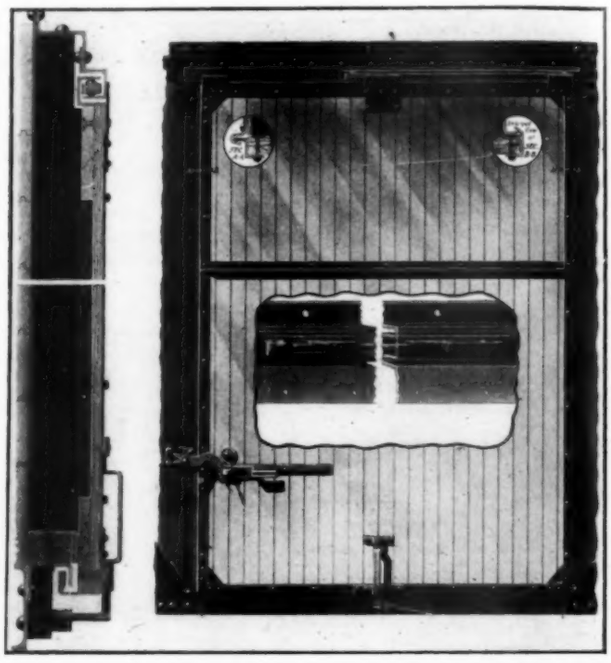
to prevent the possibility of the conduit dropping or dragging on the track in case of train separation en route or failure of employees properly to hang the couplers or coupler chains when uncoupling cars.

Ball Bearing Car Door Fixtures

THE Chicago Railway Equipment Company, Chicago, is exhibiting car door fixtures equipped with ball bearings. Provision has been made so that should the door be left open in transit and be jarred to a fully closed or opened position, it will be automatically locked, thus preventing butting against the front and back stops.

The track section is such that snow and ice cannot lodge on it. Operating members are completely housed to protect them from corrosion and oiling is not necessary. There are no roller pins to wear, and the four-way motion of the balls tends to eliminate trouble from flattened rollers. The operating members require no machining, thus doing away with the possibility of unsatisfactory operation due to inaccurate machining of rollers or roller pins. The steel hanging member extends the entire width of the door and is reinforced by center and corner plates to eliminate the danger of broken hangers. Interposed between the track and hanger are loosely housed nickel steel balls which have a crushing strength of 95,000 lb.

The guiding arrangement is novel as no external guides are used, with the attendant danger from side-swiping and of damage from road trucks or lading. The guiding member is a steel section placed under the decking, and it provides protection against outward pressure over the entire width of the door instead of at three points. Pilfering is made difficult as it would be necessary to remove



Interposed Between the Track and Hanger are Loosely Housed Nickel Steel Ball Bearings

the entire bottom door edging in order to enter the car without breaking the seal.

The fixtures can be applied to both wooden and steel doors, and are manufactured for top hung and bottom supported types.

Flexible All-Steel Roof

A FLEXIBLE all-steel roof has been developed by the Chicago-Cleveland Car Roofing Company, Chicago, the roof sheets extending all the way across the car and being made of 1/16-in. galvanized steel. One side of the roof sheet is riveted to a heavy pressed steel carline, the other three sides of the sheet being free, which give full flexibility to the roof.

The unique construction of this flexible roof is in the elimination of any cap over the carlines, one edge of the roof sheet being formed to take the place of this cap. Each roof sheet has two stiffening corrugations running from eave to eave which prevent diaphragm action. The saddles are of pressed steel, a special design being furnished for use of the running board splices to facilitate easy application of the runnings boards.

The roof design is such as to provide full ventilation. Heavy pressed steel carlines of a section designed to give extreme strength for their weight are used to tie the top of the car together. In addition there are the usual ridge pole and purlines which are fastened to the carline as well as to the end plate. The new Chicago-Cleveland all-steel roof is a modern type of flexible car roof designed to be fully ventilated and entirely weatherproof, with few parts and simple construction.

Door Controls for Suburban Service

TWO types of electro-pneumatic door operating devices for use on suburban cars and an automatic electric vestibule door lock are being exhibited by the National Pneumatic Company, New York, N. Y. The primary purpose of these devices is to prevent platform accidents and the doors, when used in place of manually operated doors, reduce delays at stations. All or any number of the doors and traps can be operated from any position on the train.

The sliding door is outside hung and so constructed that it covers and protects the step and the car platform. As the door is hung on the outside of the car it is independent of the position of the platform trap door. No structural alterations are necessary for applying the door to existing cars. The door is hung from the top on ball-bearing hangers, and is guided at the bottom of the side sill and lower step by roller guides. The door track and hangers are covered with a weather shield, and the door guide angles are inverted to prevent the accumulation of ice and snow. The door is grooved to permit it to pass the belt rail with a minimum projection, the reduced section being strongly reinforced. The projection of the door from the side of the car is 1¼ in., measured to the side sheathing, and there is nothing which any late passenger can cling to or step upon.

A flexible rubber door buffer is placed on the corner post of the vestibule. A corresponding buffer is used on the outside edge of the door. These two form a weather joint, and at the same time leave 2½ in. of soft rubber between the door edge and the vestibule post. This safety gap permits the withdrawal of a person's hand from between the door jamb and the edge of the door, even after the door has fully closed.

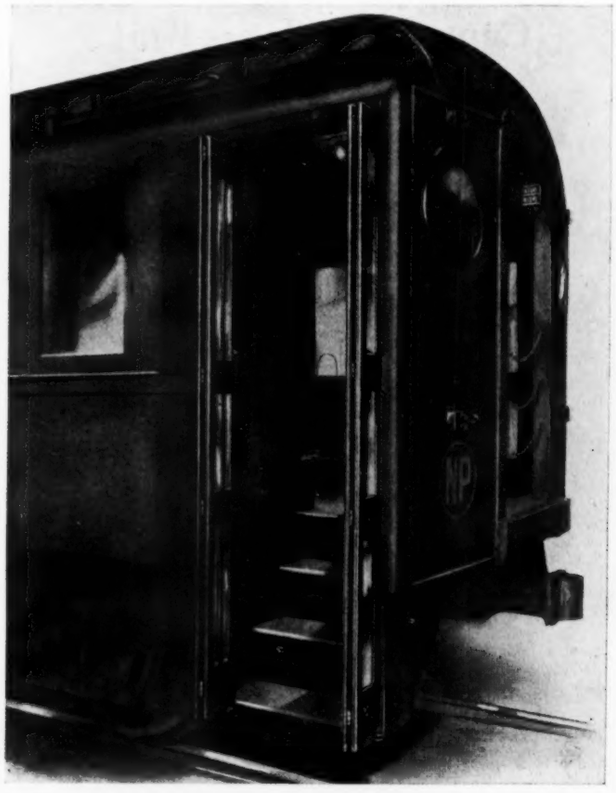
In the illustration showing the sliding door, No. 1 is the station control switch, No. 2 is the door closing button for other doors in the door control zone, No. 3 is the door closing button for the adjacent door, (i.e. the one shown) and No. 4 is a side indication lamp, which shows the trainman the position of other doors in his control zone.

When the train stops at a station, the trainman presses the door opening buttons, thus opening the doors in his control zone. He then steps to the ground, or to the high level platform, to assist passengers as usual.

When ready for the train to start, in the case of low level operation, the trainman presses the lower outside button thus closing all doors in his control zone except the adjacent door. The closing of these doors is shown to him by the side-indication lamps, which change from "red" to "out." After receiving this indication, he then hand-signals the conductor, and presses the button for his adjacent door. As this door starts to close he steps upon his car. He can, however, hold the door open by hand as long as is necessary. When his doors are all closed a white light in the vestibule gives him a continuous signal that all doors in his zone are closed. Should any door be opened inadvertently it would at once be shown by this indicator.

When both high and low level platforms are encountered the door control circuits are interlocked with the trap doors or the trap doors are operated manually as desired. The automatic operation of the traps is such that a trap will not open if someone is standing on it, and if it encounters an obstruction on closing it will not exert a pressure of more than a few pounds on it. If station stops are made on curves so sharp that the projecting corners of the trucks might interfere with the operation

Operation of Sliding Door and Trap Are Electro-Pneumatic and Can Be Used Independently for Low or High Level Platforms



Passenger Coach With Four-Panel Folding Door

of a sliding door, folding doors which open outward can be used.

The air supply for the door engines is taken from the emergency reservoir of the automatic air brake system by the use of a governor valve and a pressure regulator. The electric energy for the operation of the magnet valves is taken from the train lighting system.

The automatic lock for vestibule doors is operated electrically. The lock mechanism is connected to the train lighting generator and the door is locked automatically as soon as the train is in motion and is unlocked when the train stops. This lock can also be opened manually by a key. All of these devices are offered tentatively in their present form and can be modified to suit the particular requirements of any railroad.

Cam Gear Hand Brake

A NEW hand brake being exhibited this year by the Peoria Railway Brake Company, 122 South Michigan avenue, Chicago, at space 170, is designed to provide speed, power and certainty of brake application with a rapid take-up of 18 in. chain slack at the brake drum and delivery of over 4,000 lb. pull on the cylinder lever. By a combination of cam and gear

Peoria Cam Gear Hand Brake Applied to a Tank Car

action, the first movement of the hand wheel rapidly takes up chain slack and wear on the brake shoes and rigging, and another half turn of the wheel delivers maximum brake shoe pressure. The application of this hand brake to a tank car is shown in the illustration which indicates the relative simplicity and ease of application of the device.

Portable Trimming Saw with Safety Features

THE Crowe Manufacturing Corporation, Cincinnati, Ohio, has on exhibit a type of portable electric trimming saw which is particularly adapted to trimming work in car repair yards. The present type saw is essentially the same as the one previously described on page 394 of the *Railway Mechanical Engineer* for June, 1925. On a test recently made in one of the car shops of an eastern railroad, one man with this saw is said to have trimmed the ends from roof boards on both sides of a 37-ft. box car in four minutes, forty seconds.

Trimming Both Sides of the Roof of a 37-ft. Box Car in Less than five minutes. It is Performance Claimed for This Saw

On another job this saw was used to cut 3¼-in. by 10-in. composite car siding. This work was ordinarily handled by two men with a cross cut saw in four minutes, fifteen seconds. A report on this test indicates that it is possible for one man to handle the same job with a saw similar to the one illustrated in eight seconds.

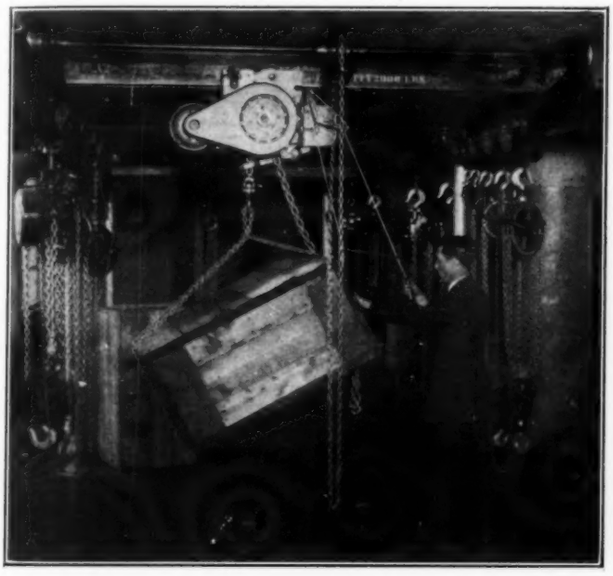
This saw is driven by a motor which is adaptable to 110 or 220-volt lighting current. An extension cord fitted with a standard light socket plug is attached. The saw is operated by a trigger switch and the circular saw blade is protected in such a way that there is very little danger of the operator becoming accidentally injured.

Car Lighting Cable

A NEW product, known as Tirex car lighting cable, is being exhibited by the Simplex Wire & Cable Company, Boston, Mass. The cable is designed to be used for generator leads, battery connectors and for train line connectors, thereby providing one cable for all three purposes. The cable has a 60 per cent rubber armor treated with selenium, the term armor being used to designate the toughness and wear resisting qualities of rubber treated by the selenium process. In addition to replacing three material stocks with one, the manufacturer states that the canvas stocking now used over generator leads is unnecessary when this cable is used.

Hand Traveling Crane of Pressed Steel Construction

INCLUDED in the exhibit of the Yale & Towne Manufacturing Company, Stamford, Conn., is a single I-beam hand traveling crane built with pressed steel ends. This crane is designed to give ease of operation and long life, and the construction permits it to be used in places where there is close headroom. The crane consists of a single I-beam supported at each end of a truck-frame of pressed steel. The I-beam is of standard size, the lower flange of which serves as a track for the trolley, as shown in the illustration.



Single I-Beam Hand Travelling Crane for Use in Close Headroom

The truck-frame is a one-piece steel stamping of rugged construction and has sufficient strength for reserve crane capacity. It is so designed that there are no undue strains placed on any member and the load is distributed equally to the two truck wheels. The I-beam rests on a bearing surface at the center of the truck-frame. It is bolted to the truck-frame at the center of the web between the two angle plates.

Due to its simple construction the crane can be easily and quickly erected in close quarters. The type illustrated is made for cranes of capacities from ¼ ton to 1 ton with spans up to and including 21 ft. Hardened and ground cage roller bearings reduces wear to a minimum on the axle and makes the operation of the crane easier. The bearing is provided for pressure lubrication and keeps the rollers well oiled at all times.

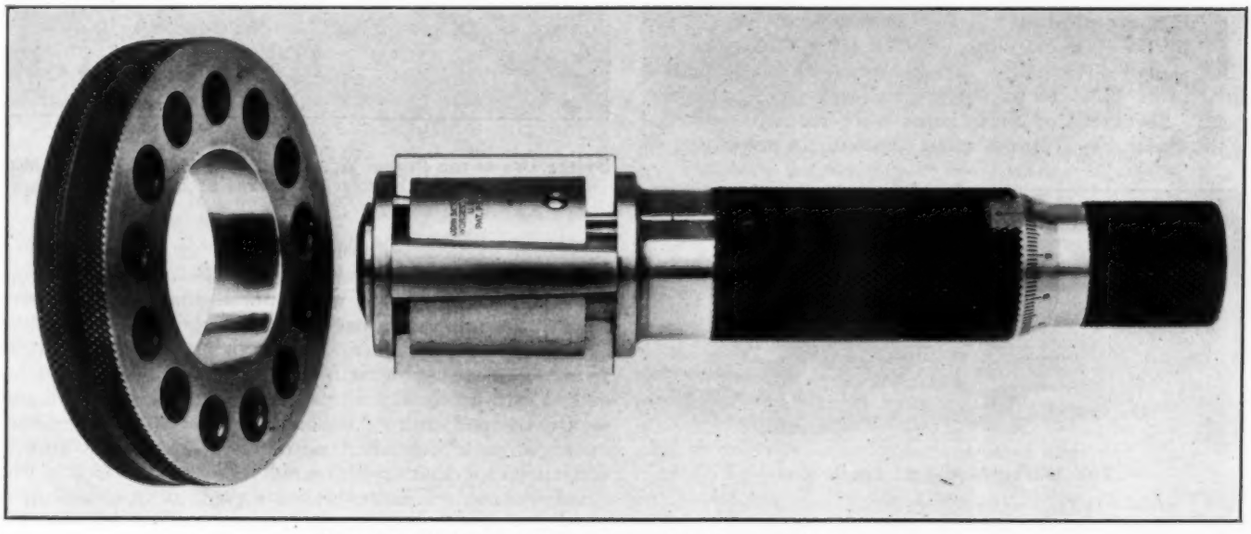
Internal Micrometer and Master Reference Ring

INCLUDED in the exhibit of the John Bath & Company, Inc., 8 Grafton street, Worcester, Mass., is an internal micrometer particularly adapted to bringing holes to exact size in the internal grinder. The micrometer applies the principle of the straight line contact to the measurement of holes. It is not a plug gage as it gives a reading in .0001 in. The .0001-in. graduations on the dial carried on the knurled handle are as large as the .001 graduations ordinarily found on an outside micrometer. The tool is made in both the plain and threaded types, the same principle applying to both. The capacity of any one micrometer is provided to allow for any ordinary variations found in holes of a particular size and also for takeup on account of wear. It is not practical to use a single micrometer for checking variations for more than one size of hole.

The adjustment of the dial on the handle is provided to compensate for wear and differences in temperature. The adjustment is quickly made and requires no skill.

The master reference ring is the basis of accuracy obtainable with the micrometer. It is made of generous width and depth, seasoned to eliminate distortion and is brought to size and carefully checked by accurate measuring tools.

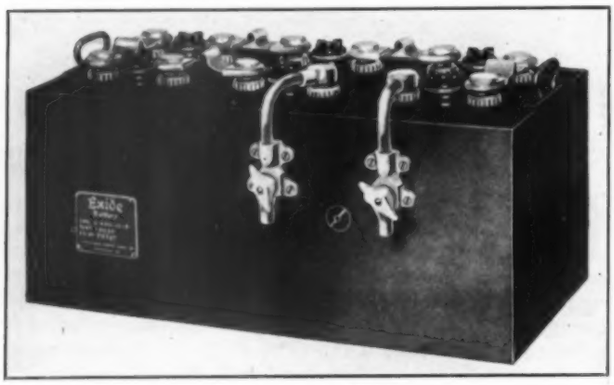
The micrometers and master reference rings are furnished in sizes from ½ in. to 8 in. in diameter.



Bath 2-in. Internal Micrometer and Master Reference Ring

New Storage Battery for Motor Coaches

THE Electric Storage Battery Company, Philadelphia, Pa., has developed a new Exide battery designed particularly for motor coach service. The sediment space has been increased considerably and there has also been provided increased space over the plates for the electrolyte. These improvements provide a battery that will perform in service for a long period without



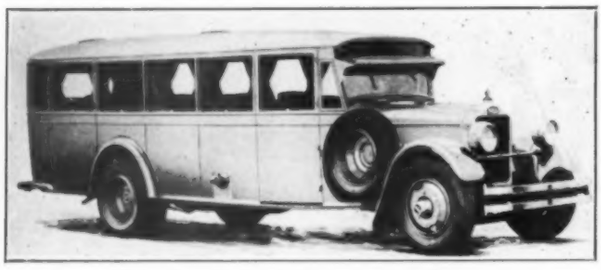
New Exide Motor Coach Storage Battery

attention, requiring water only at periods that can be scheduled with other maintenance repairs.

A special arrangement for sealing the batteries is used to prevent the possibility of any electrolyte escaping through cracked sealing compound. A special post seal nut is provided which allows the use of a ring of grease around the terminal posts. This prevents any corrosion of these parts. The jars and covers are made of a special compound to resist breakage and the plates are of extra thickness to insure longer life.

White Exhibits Small Bus Chassis

THE White Model 53 bus chassis recently developed by the White Company, Cleveland, Ohio, was designed to meet the need for a small bus with a capacity of 14 to 16 passengers, and a baggage compartment. Seventeen of these buses were recently delivered to the Santa Fe Transportation Company, a subsidiary of



The White Model 53 Small Bus

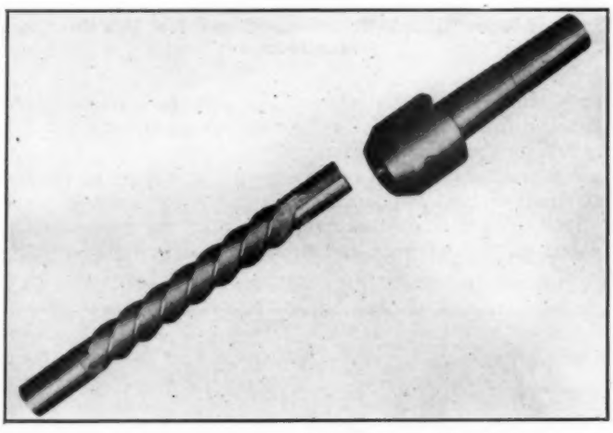
Fred Harvey, for operation in tours service in the southwest for passengers on Santa Fe trains. This tours service was described in the *Railway Age* of May 22, 1926.

For the comfort of passengers and for ease and simplicity of handling, the chassis is equipped with balloon tires, an exclusive brake design including a vacuum booster, and progressive type rear spring construction. Side sway is prevented by the method of spring suspension.

The Santa Fe buses mounted on this chassis are particularly notable for their revolving parlor type chairs. These buses also have facilities for the carrying of baggage on the roof, although provision is made in the chassis for the mounting of a body equipped for handling baggage inside the bus at the rear.

Helical Milling Cutter and Adapter Combination

AMONG the new tools recently developed by the Goddard & Goddard Company, Detroit, Mich., and included in the exhibit of this company this year, is the helical milling cutter and adapter combination shown in the illustration. These adapters are made in four sizes which will carry cutters ranging in diameter from 7/8-in. to 3-in. The 3/4-in. adapter carries cutters from 5/8-in. to 7/8-in. in diameter; the 1 1/4-in. adapter takes cutters 15/16-in. to 1 1/2-in. in diameter; the 1 3/4-in. adapter, cutters from 1 9/16-in. to 2 1/8-in. in diameter and the 2 3/8-in. adapter cutters from 2 3/16-in. to 3-in. in diameter. The adapter heads are standardized, but the taper shanks are varied to fit the machine upon which they are to be used. This enables shops to affect a

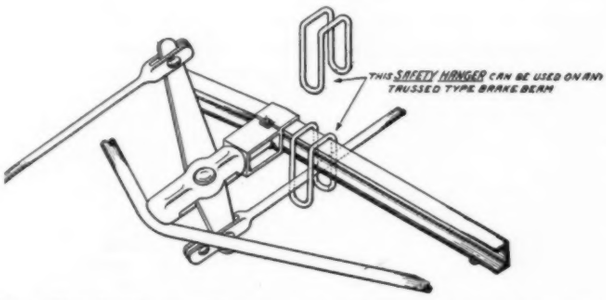


By the Use of the Proper Adapters These Helical Cutters May Be Used on Several Different Makes of Milling Machines

definite reduction in tool inventory, as cutters may be transferred from one machine to another by merely having these machines equipped with suitable adapters. The drive ends of the cutter proper are standardized in four sizes to fit the four standard sizes of adapters; thus cutters from 5/8-in. to 7/8-in. will have a 3/4-in. diameter drive end; 15/16-in. to 1 1/2-in. diameter cutter a 1 1/4-in. diameter drive end, etc. The angle of spiral and undercut on these cutters is such as to effect maximum cutting efficiency together with rapid egress of chips. The drive end of the cutter is keywayed to fit a key permanently positioned in the adapter. The cutters are made in high-speed steel only.

Safety Hanger for Brake Beam Bottom Connection Rod

THE Chicago Railway Equipment Company, Chicago, has included in its exhibit the Economy brake beam bottom connecting rod safety guard. In the design of this safety guard, shown in the illustration, advantage has been taken of experience gained in the development of the Creco brake beam support and safety



This Simple Device Prevents the Bottom Connecting Rod from Falling to the Ground

device, and a vibration-absorber spring has been incorporated which can be used on any trussed type of brake beam. The double U-spring fits over the beam and around the bottom connecting rod, which, if it should fall for any reason, would be prevented from dragging along the ground.

Attachment for Finishing Frame Bolts

THERE appears to be no very well defined, standardized practice in the manufacture and finishing of locomotive frame bolts. Owing to the widely varying quantity demand in large and small shops, and owing equally to differing specifications, the finishing of frame bolts by any standard method may be considered at the outset a difficult problem at best. Quite recently the problem of finishing tapered bolts was put up to the machine tool builder, and has resulted in a newly designed tooling equipment to be adapted to a standard turret lathe for the manufacture of bolts either from bar stock or forgings and which it appears can be used for finishing bolts in any stage desired, from the rough turned bolt for the storekeeper to the completely finished and threaded locomotive frame bolt as required to fit a reamed hole of any given size in the frame.

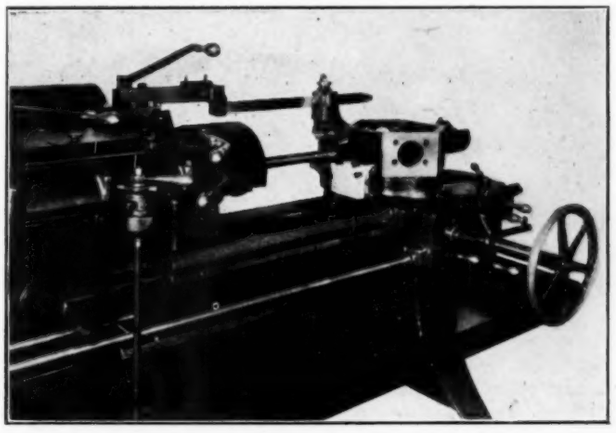
Experimental work on one such machine has been done at the plant of the Warner & Swasey Company, Cleveland, Ohio, and tests have been run on this company's standard 2-A universal machine, equipped with its patented automatic roller rest taper turning tool.

The material used in the test comprised bolts of varying diameters and lengths, forged with both round and hexagon heads, of material answering the usual specification for locomotive frame bolts. The rough forging was held in a standard, drawback automatic collct mechanism, fitted with serrated jaws and operated by an air chuck and cylinder of standard make. During the test it was developed that the job could be held equally as well in two- or three-jaw chucks operated by air; the latter equipment was equally efficient in operation, but slightly more expensive.

The actual finishing operation consists of chamfering with a standard Warner & Swasey chamfering tool. The turning operation is performed by first chamfering the rough end of the bolt with a standard Warner & Swasey bell-mouthed chamfering tool to remove the rough edge, and permit ease in starting the turning tool. The taper shank of the bolt is then turned with the automatic roller rest taper turning tool recently designed and patented by the Warner & Swasey Company. This tool is guided in turning any desired taper within its range by an overhead tapered guide bar, supported by means of a hinged mounting at the head end of the machine. Separate guide bars are required for each degree of taper and are easily and quickly mounted in working position. The tool is so designed that it can be quickly and accurately set to any desired diameter by means of a graduated dial of large diameter, reading in graduations of .001 in.

In operation, the turning tool is so constructed as to allow the rolls which travel slightly in advance of the cutter to recede as the turning tool recedes on an ascending tapered guide. The roll carriers and cutter block are so coupled together that their movement is simultaneous and the entire movement is actuated by the tapered bar mentioned above. The entire turning tool is made from steel forgings of heavy dimension and is so rugged in construction that even under heavy cuts, test has proved that it produces a very high degree of finish with a corresponding degree of accuracy.

In running the production test on 1⅝-in. by 16-in. bolts, it was found that a satisfactory job could be produced in the flat time of 1¾ minutes per piece, or an hourly production of 30 bolts per 52-minute hour. Finished bolts were tested on blocks for out-of-round and straight turned surface and found to come well within the most particular requirements.



Attachment Used on Warner & Swasey Turret Lathe for Finishing Locomotive Frame Bolts in 1¾ Minutes

Considerable interest has been manifested in this equipment on the part of several railroads that are sufficiently interested in the manufacture of locomotive frame bolts to realize that from the method proposed it is quite possible to effect a considerable economy over and above the methods now commonly employed.

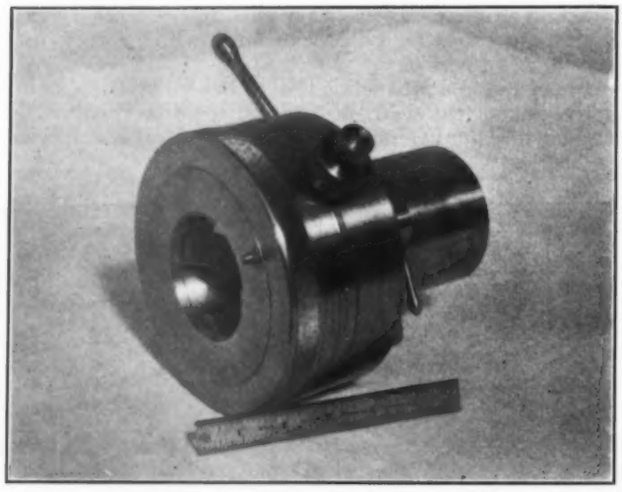
The Warner & Swasey Company is operating this machine, at its booth, on the production of representative types of frame bolts.

No. 7-H High Speed Die Head

THE Jones & Lamson Machine Company, Springfield, Vt., has on exhibition this year a high speed series of die heads, the No. 7-H of the regular non-rotating pull-off type, having a capacity of ¾ in. to 2 in., inclusive.

This die head supersedes what has been known as the No. 6, and incorporates important improvements to meet the increasing demand for accuracy, interchangeability and ease of operation. In particular it is designed to operate high speed chasers, with the ground and lapped thread form. The die head, exclusive of shank, is 4 in. long and 6⅝ in. in diameter.

The die head is placed in the machine with the locking handle on top in easy reach of the operator. Directly underneath is the new type of adjusting screw of the worm and gear type. The head of this screw has graduations which read in .001 in. This adjusting screw is held in the die body by a fine pitch screw, thus minimizing the travel while being adjusted. The double thread worm actuates the eccentric bushing from undersize to oversize in slightly more than one revolution. The binder locks this adjusting screw securely in position. The roughing and finishing lever is on the operator's side, adding still further to the ease of operation.



Jones & Lamson No. 7-H High Speed Die Head

The cover is locked in position by a bayonet lock. Pressure of the thumb on a button and a slight turn of the cover releases the lock so that the cover readily pulls from the body and the changing of chasers becomes a simple operation.

The cam is of the usual construction but with a deeper bearing on the chasers. The cam is equipped with an outside tripping button used for shoulder work or for releasing the die when necessary.

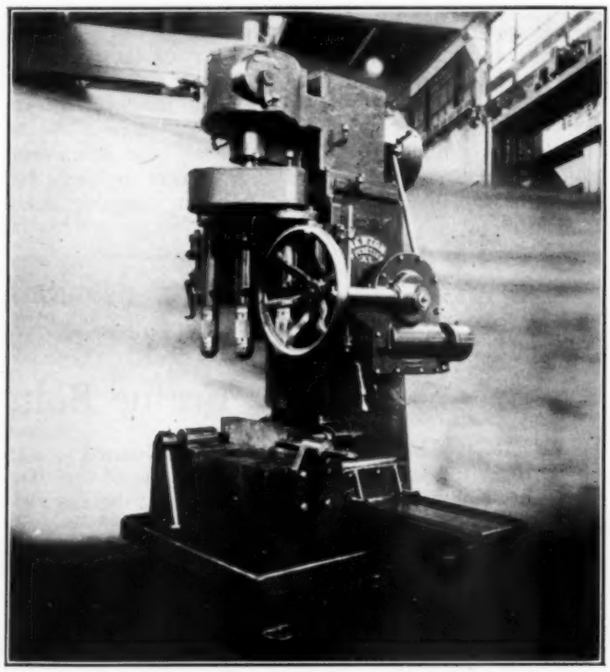
The chasers are directly on center and have the points of the threads at a 20-deg. top rake or cutting angle. They are ground with a 20-deg. clearance angle and a chamfor or throat angle varying from 15 to 35 deg. to meet the thread depth. A special chaser grinding jig furnished with the die is graduated to meet all grinding requirements. The thread form of the chasers is ground and lapped.

For diameters from ¾ in. to 1½ in. inclusive the chasers are of the extension type, allowing the die to cut to a shoulder.

Three-Spindle Rail Drilling Machine

ONE of the machines being exhibited by the Consolidated Machine Tool Corporation of America, Rochester, N. Y., is a Newton three-spindle rail drilling machine. This machine is built especially for rail shops and is simple in design and operation. It is fitted with hardened steel spindles which are adjustable on a vertical saddle, giving a maximum center distance of 12 in., or 24 in. between the two outside spindles. The spindles are fitted with ball thrust washers and are driven by heavy pitch wide face gears. The vertical saddle is provided with screws for adjusting the spindles by hand for center distance, after which they can be securely clamped by tee-head bolts. The saddle counterweight is contained in the upright and supports the saddle by two chains.

The speed box and driving head form a complete unit. The speed changes are made at the front of the head and are obtained through triple sliding gears. A lever through a rack and pinion shifts the sliding gears for the



Newton Drilling Machine Designed for Rail Shops

desired speed. The change gears have stub teeth which are of high grade steel and heat treated.

The feed is taken from the main driving shaft at the rear of the speed box and is transmitted through bevel gears and a vertical shaft to a worm and wheel at the rear of the right hand side of the machine. The worm has a slip friction which acts as a safety device in case the drill sticks. The feed box is provided with a mechanism for tripping the feed which is knocked out by means of a rod, equipped with an adjustable collar that comes in contact with the feed trip arm on the vertical saddle. The feed can be engaged or disengaged by a capstan handle and bevel gears which mesh directly with the rack pinion. The final drive to the feed is from a large worm gear in the feed box to the rack pinion inside the column.

The work table is made integral with the column and is provided with a tee-slot for clamping the rail supports.

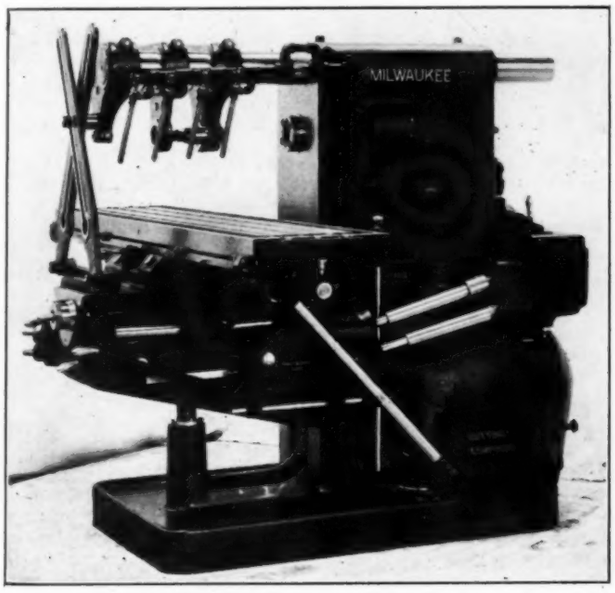
A squaring block is provided which has an adjustment from the center of the spindles from 1¾ in. to 4 in. The clamping screw is located at the front of the table and the stop screw is at the right hand end.

The column is rigidly constructed and has a trough for catching the cutting lubricant. The meter bracket is bolted to the side of the column and is provided with screws for adjusting the motor rails for tightening the driving belt. All gears are fully enclosed to run in oil and to give protection to the operator.

Kearney & Trecker No. 4 Milling Machine

POWER rapid traverse in three directions, Timken roller bearings and self-oiling universal joints are a few of the refinements incorporated in the No. 4 milling machine being exhibited by the Kearney & Trecker Corporation, Milwaukee, Wis. The main spindle gear train is equipped with Timken tapered roller bearings. The spindle itself is mounted in tapered bronze bearings which can be adjusted from the outside.

Power rapid traverse is provided not only for the table, but for the saddle and knee as well. It is possible to traverse the table longitudinally in either direction at the rate of 150 in. per min., the saddle in or out at 70 in. per

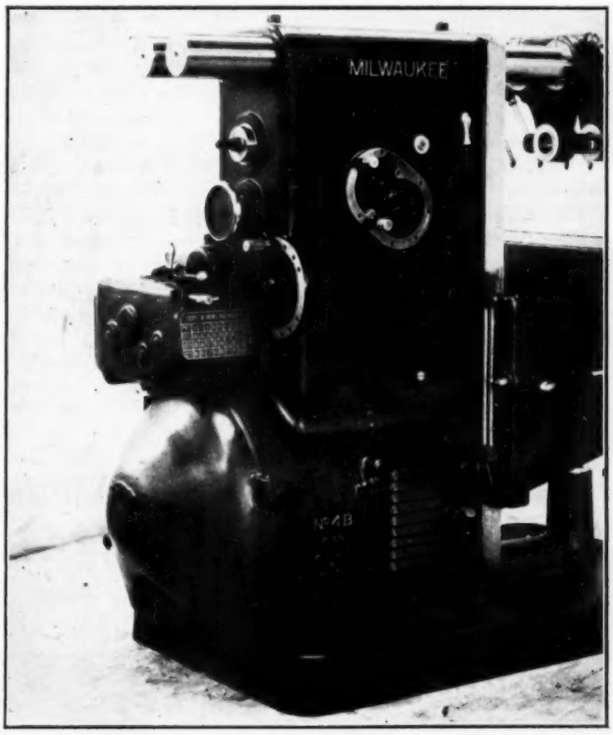


The No. 4-B Plain Milling Machine

min., and the knee up or down at the rate of 50 in. per min. These three movements are conveniently controlled from the front of the machine. The engagement is through a multiple disc friction clutch.

The machine is equipped with two separate automatic pumps. The pump for operating the automatic flood lubrication for all gears and bearings inside the column and feed box is located on the left side of the column. It is directly above the filler cap and sight level gage. All that is necessary to remove the pump from the machine is to remove the four cover plate screws. The cover plate of which this pump is an integral part, has drilled into it from either end the intake and outlet passages for the oil, so that when the plate is removed, the pump comes out without having to break any pipe joints. Practically the entire machine is automatically lubricated from three filling stations.

The cutter coolant pump is located on the right side of the column at the rear of the reservoir marked "cutting compound." This pump is driven by the vertical shaft from the feed box, and by a convenient clutch lever may be made inoperative when milling cast iron or other materials that do not require coolant for the cutters.



The Motor is Enclosed in the Column of the Machine

There are duplicate table, cross and vertical feed control levers located at the front of the knee and left rear of the table. This is convenient when milling large pieces as it enables the operator to stand back of the table in clear view of the milling cutters and completely control his machine. There are also duplicate control levers for starting and stopping the machine, which engage the main drive multiple disc friction clutch, which is designed to operate continuously under full load. The same kind of clutch, only smaller in size, is located inside the splash lubricant chamber in the knee, and engages all power rapid traverse movements.

The machine is provided with eighteen changes of feed in either direction, ranging from ⅝ in. to 25 in. per min. The feed box is a new design of the sliding gear transmission type. The gears run in oil supplied by flood lubrication. The feed change levers are operated from the left side of the machine from the same position the operator occupies when changing speeds. A safety slip clutch is located on the rear end of the upper universal drive shaft, just in front of the universal joint.

The conventional design of universal joints has been departed from and instead of pinning the joint forks to a swivel block in the center, the joint connections are made on a swivel ring which is larger in diameter than the universal joint shaft itself. This offers greater resistance against torsion.

There are oil pockets inside of the feed box and also inside the splash lubricant chamber in the knee, which provides a head of oil above each end of both universal

joint shafts. The oil flows through passages drilled in the joint forks and is carried by centrifugal force into the ring, thus keeping the connecting pins automatically lubricated at all times.

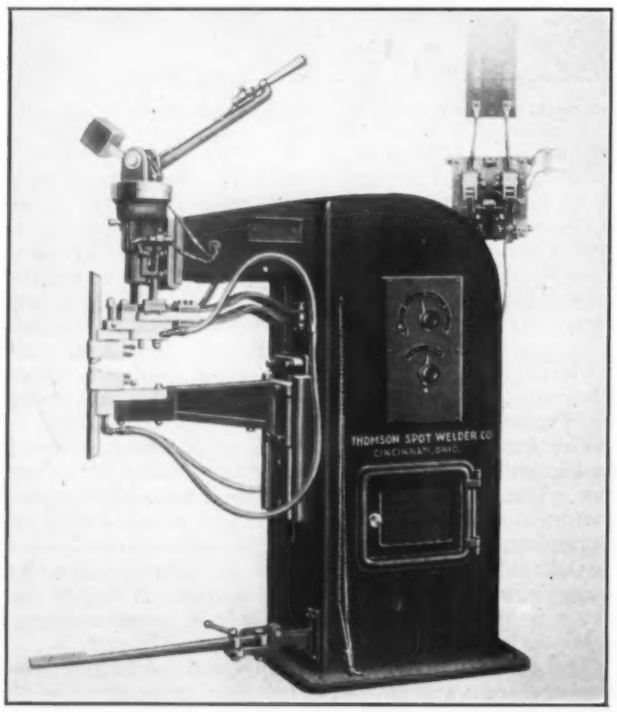
The No. 4 machine is primarily designed for motor drive, and the belt drive is the attachment. The same column is used in either case, and to change from motor to belt drive it is only necessary to remove the rear door of the motor compartment and bolt in its place the bracket sleeve and pulley. This change can be made at any time during the life of the machine.

For the standard motor drive, the motor is placed with its pinion toward the front of the machine. This provides a direct gear drive and enables the motor pinion and idler gear to be located in the main column of the machine where they are automatically lubricated. Facing the motor in this direction allows the brushes to be accessible.

The No. 4 milling machine is furnished in three models —Plain, universal and vertical. The normal range is 42 in. by 14 in. by 20 in., but any machine can be furnished with a long table, giving an increased longitudinal feed of 52 in. The weights range from 10,800 lb. in the plain to 12,400 lb. in the universal.

Spot Welders for Heavy Sheet Metal

ONE of the machines being exhibited by the Thomson Electric Welding Company, Lynn, Mass., is a heavy-duty spot welder designed for handling sheet steel and iron up to 5/16 in. thickness and also soft



Spot Welder Designed for Heavy Work on Flat Sheets

sheet brass up to No. 14 B & S gage. These machines are built in various sizes, one of which is shown in the illustration, for different kinds of work. The lower horn of the welder is of cast copper and is made as narrow as possible to get into small openings. The top is covered with a brass jacket insulated from the horn itself to prevent sparking should the work rest against the metal at any point. This horn is not made to stand heavy strains and is not recommended for heavy stock where considerable pressure is required to bring the stock together for welding. This machine can also be equipped with a swinging table which is secured to the side of the column.

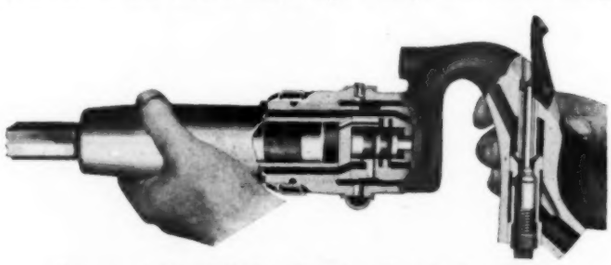
The dies are water cooled and have interchangeable points. For heavier work, a solid die is recommended instead of the water cooled type, the solid dies being cooled by contact with the water cooled holders.

The Thomson spot welders are built in several sizes to handle a large range of work and the various types on exhibit are capable of handling up to 3/16 in. soft cold rolled steel under ideal conditions for welding. These machines have a throat depth in four sizes ranging from 15 in. to 51 in. and are 75 in. high, set up on the floor.

Spool Valve Chipping Hammer

THE Thor chipping and calking hammers, on exhibit by the Independent Pneumatic Tool Company, Chicago, are now available in the "spool valve" type for use where grit and dirt work into the hammer, and must be eliminated to obviate wear and tear on the moving parts. The action of the spool valve is to deflect grit and dirt from the bearing surfaces and this characteristic makes the hammers well adapted to railroad shop use.

The illustration affords a view of one of these hammers with the outside shell cut away to show the internal construction. The hammer handle and throttle are similar to those in the sleeve valve type except that the locking



Improved Spool Valve Construction in the Thor Chipping Hammer

device is said to be the most positive handle and barrel lock ever used. The ratchet teeth on the sliding collar interlock with similar teeth on the handle, and the collar is held stationary by its octagonal inner surface, which fits the large octagon on the barrel. This construction is similar to that of the Thor riveter and an important advantage results from the fact that no matter where the handle seats, the collar may be turned to that octagonal side which puts it in exact mesh with the handle. There is no lost motion.

The spool valve is operated by constant pressure on its back end and intermittent pressure on the front end, caused by the flow of air to the lower end of the piston. The design is intended to prevent the escape of any of the air operating the valve without being used for the piston stroke, consequently resulting in economy in air consumption.

Other features of this hammer are the self-seating throttle, designed to be always air-tight, spiral inlet ports affording accurate regulation, and barrels of special alloy steel, hardened, ground and lapped to size, thus assuring a full bearing to the piston with consequent long barrel life and maximum hammer efficiency.

Radio Controlled Clock Provided for Train Indicators

THE Watson-Stillman Company, 50 Church street, New York, has included in its exhibit a full size model of its recently acquired National train indicator. The one on exhibit has been equipped with two clock faces controlled by a master clock which can be

National Train Indicators with Two Clocks which are Electrically Controlled by a Master Clock, that is Corrected Twice Daily by Radio

corrected twice daily by radio from the Washington observatory. This system, which has been installed by the Radio Electric Clock Corporation, with its simplicity and accuracy insured by the automatic radio resetting device, has eliminated the human element. The secondary clocks in the indicator are run and controlled by a master clock which can be installed in the train dispatcher's office and the secondary clocks in all the stations, train sheds and other necessary offices of the system.

The electrical impulses are sent out over the telegraph wires of the railroad to the secondary clocks and the entire system is synchronized with the Government Observatory time and corrected daily by radio.

The Dalman Truck

THE Dalman type of freight car truck, being exhibited in booths 149-151 by the American Steel Foundries, is designed primarily to increase spring capacity and retain the same resilience without changing the dimensions of existing A. R. A. standard bolster spring coils.

This truck, an earlier design of which was described in the Daily *Railway Age* of June 13, 1924, page 1489, has recently been redesigned by the American Steel Foundries, Chicago, and the modified design is being exhibited by this company during the conventions this year.

In the 50-ton truck the usual group of four double coil springs is increased to four double A. R. A. coils and two A. R. A. outer single coils. In the 70-ton truck the usual group of five double A. R. A. coils is increased to seven double coils. The introduction of the additional springs is made possible by the unique patented arrangement of the side frame opening and the end of the truck bolster, the general form of which was previously described.

In the former design of this truck the spring plank was flanged at the sides to fit over the top of the side coil spring seats, and considerable difficulty was encountered in shimming these springs, which are not included in the center group spring caps. In the American Steel Foundry design the spring plank has been redesigned to a simpler form and a boss has been placed in the center of each side spring seat to fit into a hole in the single spring bottom cap. The sides of this cap are flanged down so that when a washer is placed over the boss in the spring seat the cap is held in place by these flanges.

The tension member of the truck side frame has also been redesigned to conform more nearly to a true suspension curve. In the truck being exhibited the bolster has been designed to include the Barber lateral motion rollers.

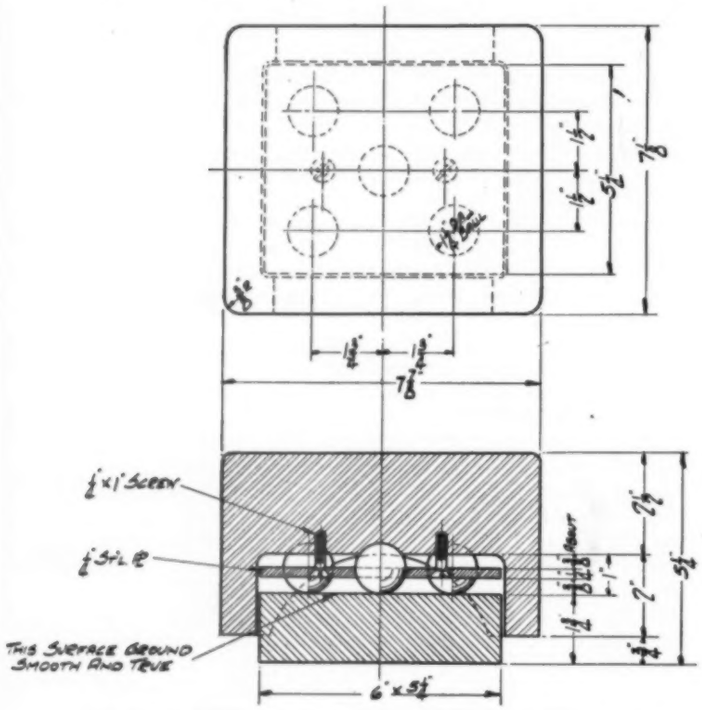
The Dalman truck is designed to conform with the recommendations of the A. R. A. Committee on Car Construction as to strength, service and safety. It is interchangeable as a group of parts as to center plate height, side bearing spacing, wheel base, etc., with A. R. A. standard recommended designs.

The American Steel Foundries Design of Dalman Truck

Method of Test Friction Draft Gear

THERE has been a number of devices used to determine the resistance offered by a draft gear while being closed by the fall of the 9,000-lb. weight. Some of these devices give results which are so inaccurate that the results are not dependable.

One of the illustrations shows a general drawing of a device which the Hall Draft Gear Corporation, Watervliet, N. Y., is using in connection with a 9,000-lb. drop testing machine. The other illustration shows a curve plotted from the readings taken on a friction draft gear



General Drawing of a Device Used in Connection with a 9,000-lb. Drop Testing Machine When Testing Draft Gears

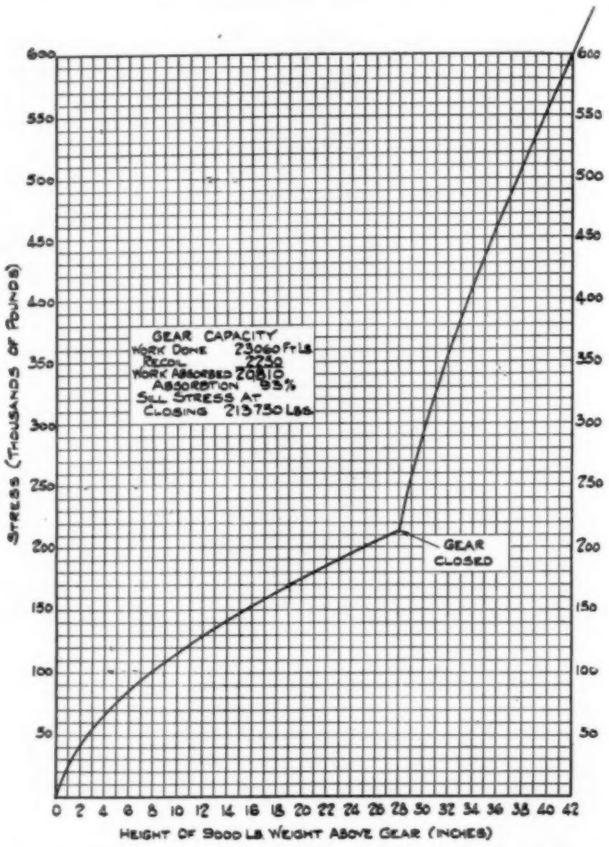
test. To make this curve, the procedure is as follows:

The lower block is cut to size, 5¼ in. by 6 in., which are the dimensions of the Type D coupler butt. The analysis of this block is approximately .30 carbon for ordinary testing. Where pressures up to 1,000,000 lb. are to be taken, the carbon content is approximately .80. Both the top and the bottom sides of this block are ground in order to obtain accurate readings of the ball impressions.

Before starting the draft gear test proper, a single ball is pressed into one surface of the test block using an ordinary beam test machine. A depth micrometer is used to read the depth of the ball impressions, starting at 1,000 lb. increasing the pressure in increments of 1,000 lb. and taking the depth readings until the desired capacity is reached. A curve can then be plotted to be used in reading the pressure applied to each of the five balls later used on the other side of the test block under the drop test.

In making the draft gear test proper, the completely assembled device is placed between the draft gear and the falling weight in a position where the coupler butt ordinarily transmits the load imposed on the draft gear. The weight is then lifted one inch and released and the depth of each ball impression is measured. The height of fall is then increased by increments of one inch measuring the depths of the ball impressions after each blow until the desired pressure is reached, or until the failure occurs. A curve similar to the one shown can then be plotted from these results, by comparison with the calibrated impression made in the beam test machine.

The results of this test indicate the sill stresses certain draft gears will set up in absorbing shocks of different magnitudes, the amount of stress which the draft gear will resist before failure after the closing point is reached and also if the oversolid capacity is greater than the



Curve Plotted from Readings Taken on a Friction Draft Gear Test

coupler butt capacity and not sufficient to destroy the car sills or attachments under wrecking impacts. Curves from various makes of draft gears can be compared to determine which make of gear offers most car protection.

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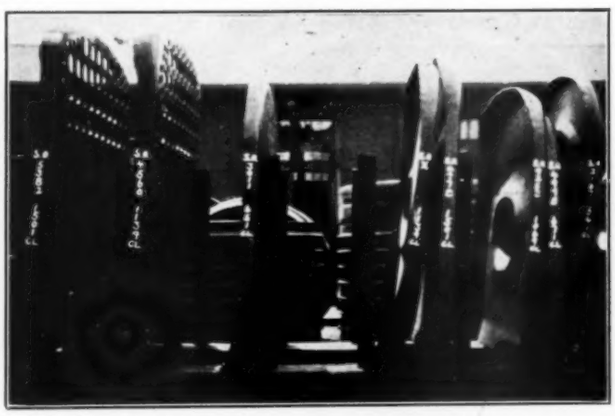

How the Illinois Central Stores Flue and Door Sheets at Waterloo, Iowa